

Radio Control CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

INSIDE KINWALD'S
WINNING CARS

March 1996

**SPECIAL
OFF-ROAD
TECH
ISSUE**

- RUN LONGER
- GO FASTER
- TUNE FOR BUMPY TRACKS
- IMPROVE HANDLING & PERFORMANCE



**KYOSHO
Hi-Rider II
Vette
and GP-10**

**TAMIYA
HKS Opel**

R/CPTA WORLD'S

Big Trucks Pull 500+ lb.



**HOW
TO
FILL & BLEED
SHOCKS
GLUE TIRES
LOWER YOUR SEDAN**

**Future R/C
WILL ROBOTS RULE? Page 68**



PLUS

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fixes**
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ON THE COVER: the Kyosho HiRider II kicks up the sand (photo by John Howell).

ABOVE: the Kyosho GP-10 blazes by the competition (photo by John Howell).

RIGHT: crazy antics at the Robot Wars (photo by Rob Wood).



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EDITORIAL

R/C of a Slightly Different Sort...



A "Robot Wars" combatant is being readied for battle (story on page 68).

Radio control isn't limited just to hobby use. In many other fields, R/C is used to perform all kinds of functions and to solve a variety of problems.

In the movie industry, for example, many special-effects experts use radio control to bring their creations to life. Did you know that many of the dinosaurs in the movie "Jurassic Park" were R/C-operated? Effects wizard Stan Winston, the creator of such notable and nightmarish monsters as the "Terminator" and the demon from "Pumpkinhead," used R/C to control some of the functions of the terrifying endoskeletons in the movie "T2."

Servos just like the ones we use to steer our cars and trucks can be used inside a puppet's head to raise an eyebrow, blink an eye, or open a mouth. Before they considered R/C, effects technicians relied on cables and wires to control movement—obviously bulky and cumbersome in comparison.

Radio control has found its way into another area as well—the battle arena! For the past few years, a group of talented, creative (and perhaps a bit demented) people have come together to compete in "Robot Wars"—an event in which mechanized, R/C monstrosities do battle in true gladiatorial fashion.

As you'll see in Rob Wood's coverage of "Robot Wars" in this issue, except for the chain saws and battle axes, many of the robotic contenders bear some resemblance to our beloved R/C vehicles—although comparing some of the larger and more elaborate 'bots to an R/C car would be like comparing an iguana to a tyrannosaur.

As an R/C hobbyist and dyed-in-the-wool sci-fi buff, to me, Robot Wars represents what may well be the future of our hobby. I see wheels replaced by treads or legs; fully articulated arms with pincers; qualifiers and mains replaced by rounds and matches. This could be cool!

In the same theme as Robot Wars, we also bring you coverage of an event in which monsters of a different sort compete—the National Radio Control Truck Pulling Association's World Championships. You've told us that you want more monster and pulling trucks, and this event represents the height of the truckin' craze.

Ours is an exciting hobby and one that promises to keep pace with emerging technology, not be outdated by it. These events represent only the tip of the iceberg of creativity and ingenuity that's abundant in the R/C hobby.

Frank Masi, Executive Editor

We want to hear from you! Write, fax, or e-mail us on the Internet:
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Radio Control CAR ACTION

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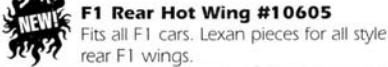
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LETTERS

THE FROG THAT KEEPS ON HOPPIN'

First, you have a great magazine. Second, do you know whether Team Associated is going to make a gas conversion kit for the RC10 Championship Edition? Third, do you know where I can get an original body for the 1985 Tamiya Frog? I have one that still runs, but the body has been destroyed. I'd appreciate your help. Thanks!

DAN EMERT
White Bear Lake, MN

Well, Dan, no, I don't think Associated plans to offer a gas conversion for the RC10CE. But check with Moody Automotive, 755 Ash St., Flossmoor, IL 60422; (708) 799-5597. They offer nitro conversion kits for the RC10 and RC10T. As for your other question, I'm stumped. I don't know of anyone who has an original Frog body. Call Tamiya America at (800) TAMIYA-A to ask whether they can point you in the right direction. It's a really cool car (actually, it's the first R/C car I ever owned), and I wish Tamiya would re-release it (only with different drive shafts!). Good luck with your search.

Doogie

HE'S BACK!

I've been out of the R/C hobby for 11 years, but I spotted your magazine at a local bookstore and it re-sparked my interest. I used to belong to an R/C motorcycle club; we built choppers, trikes, ATVs and dirt bikes. They were all gas-powered and based on a 4x4 buggy with a chain drive. Would you happen to know if this car is still around and where I can get one? How about a clutch and clutch bell for .10 and .12 engines, buggy tires and wheels, brakes, ATV balloon tires and wheels and gas 4x4 drive-shaft parts? I'm sure you'll think this is crazy, but they were a blast! Thanks for any assistance you can provide, and thanks for not laughing too hard!

JOHN HAFAY
Alamogordo, NM

Wow, John, I don't know what to tell you. As for the chain-driven, gas-powered buggy, you'll have to give us a little more info. Was it an $\frac{1}{8}$ -scale, off-road buggy? When was it produced? Do you remember who the manufacturer was? I need more

info, man! The only thing I can help you with is the clutch and clutch-bell setup. Check with OFNA Racing and Great Planes/Hobbico for more info on clutch and clutch-bell setups for .10 and .12 engines. As for your other questions, here's where our readers kick in. If anyone has info they can pass along to John, drop us a line and we'll get it to him.

Doogie

IT MIGHT NOT BE WORTH IT

To start, your magazine rocks! I wonder if I can replace the electronics in my Radio Shack Black Wolf with Novak electronics?

J.J. PALMER
Hudson, MI

That's an interesting proposal, J.J. I'd say that you could do it, but I don't know that it would be worth the overall aggravation. I guess that you would also have to get a new steering servo. If you're on a budget, your best bet is to save some money and try to buy a used R/C car from your local "bargain news" newspaper.

Doogie

TRUCK TRIVIA

I have recently started in R/C. There's some pretty cool stuff in your magazine, but how about testing the Tamiya Globe Liner? I'd like to know how fast it will go. Also, I have a Traxxas Sledgehammer, and I'd like to know how to clean its body. I have already painted it on the inside and put the decals on the outside. Thanks much!

JIM VEIGL
Cullman, AL

Hey, Jim, check out the February '95 issue of *Car Action*. You'll find an in-depth "Thrash Test" on the Tamiya Globe Liner. Its top speed varies depending on which batteries and motor you use, but keep in mind that the Globe Liner wasn't designed for high-speed driving. I'm told it gets up to some challenging speeds when the trailer is detached (tractor only).

As far as cleaning your car body, when it's extremely dirty, submerge it in soap and water; when it's slightly dirty, just wipe it off with a damp, clean rag. Autographics makes a product called "Slick Stuff," which

(continued on page 10)



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LETTERS

(continued from page 8)

gives the body that just-waxed look and provides a protective layer that actually repels dirt and dust.

George

SCRAMBLED YOKE

First of all, your mag blows all others away—R/C car mags, full-size car mags—everything! I need your help! I have a YR-4, and I'm having serious problems with the radio. The car will only go about 50 feet before it goes crazy. It has a graphite chassis, and I use a Novak micro-receiver, an Airtronics XL2P radio, an Airtronics 94151 servo, a Novak Tempest speed control and a 17-turn, machine-wound modified motor. The speed control is located opposite the servo. My batteries are strapped to the chassis and hard-wired. I'm using Deans four-prong plugs on my motor. The receiver is mounted on a piece of Lexan about an inch above the upper plate that's mounted on the screw for the center aluminum spacer. All the capacitors and diodes on the motor are pretty good. I don't have a clue what's wrong, but I did change the motor, receiver and crystal, and it still glitched. Everyone I talk to says I should buy an FM radio, but as you can see from my parts list, I'm broke!! Can you give me any advice on what to try next? I love this car, but it's killing me. The car just goes where it wants to; it doesn't just stutter. I'd appreciate any advice. Thanks for the help.

Also, Doog, how's your "Doug-killer" YR-4 coming? When are we going to see an article about it? And where

can I get a catalogue with hop-ups for my Yoke?

TOM POWERS

fitz@ns.gamewood.net

Well, Tom, I say you definitely have a problem; your car should go much, much farther than 50 feet away from you before you lose control. It looks as if you made changes in all the potentially problematic areas (receiver, crystal, motor), but you still have problems, huh? Have you tried mounting your receiver in another location? What about outside interference such as nearby radio towers or high-tension lines? Have you tried running it somewhere else? If you still encounter the same problems, then I'd have to agree that it could be your radio. If all your efforts fail to fix the glitch, you

might want to call Airtronics [(714) 830-8769] to see what is involved in getting your radio serviced.

As for my "Mertes Mauler," I was initially planning to use a regular YR-4, but now there's a YR-4 Special available from Yokomo! It comes with a lot of really trick parts as standard equipment. I've also been having some really good run time with my hopped-up Kyosho Spider, so I might just stick with that; only time will tell!

Regarding your catalogue question, the person I've had the best dealings with for YR-4 and other Yokomo information is Cliff Murukami over at Ultimate Hobbies in Orange, CA—(714) 921-0424. You might also want to check with Factory Works [(909) 735-5516] and Japan R/C Imports [(510) 284-5778]. Good luck!

Doogie

HINGING ON OUR RESPONSE

I have a quick question concerning the article by Kevin Hetmanski in the January 1996 issue, "Make Opening Doors." Which model of the Sonic Tronic Hinge did Kevin use? There are about eight different models. I hope you can publish an answer soon. Thanks!

ANTHONY WONG

akwong@trimedia.scs.philips.com

I spoke with the "door man" himself, and Mr. Hetmanski prefers the Sonic Tronic no. 130 Hidden Hinge. You could also use the no. 131 Hidden Hinge, which has a built-in control arm that allows you to open and close the doors using an auxiliary servo.

Frank

WRITE TO US! We welcome your photos, drawings, comments and suggestions.

Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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READERS' Rides

SOUPED-UP SEDAN

This hot-looking sedan comes from Jose A. Regidor Jr. of Chicago, IL. Jose's car—a 4WD Tamiya AMG Mercedes C-Class touring car—is equipped with Tamiya hop-up parts and aluminum wheels, a Tekin TSC-410K ESC, a Trinity Green Machine 2, Sanyo 1700 SCRC matched cells, front and rear universals, a ball diff up front, a rear sway bar and front and rear HPI lowering kits. Jose controls his machine with the help of a Futaba 1024 PCM radio. According to Jose, this car is a parking-lot killer! It sure looks pretty stylin'....You'll have to bring it our way and race against us sometime!



MAGNA MACHINE

Chad M. Lawhon's HPI Street Machine is outfitted with a Trinity Midnight stock motor, 64-pitch gears, full ball bearings, Deans Ultra Plugs, a Futaba MC210CB speed control and a Futaba 2PB transmitter. Chad's Camaro is modeled after the IMSA Trans Am series Magna Camaro, and all the major decals (including the red and white bowtie) were hand-cut out of premium vinyl. Silver taxidermy nails were used for the window rivet trim. Apparently, Chad and a few of his coworkers race on their lunch break and though they don't do any serious racing, they tear it up on the tennis courts and in parking garages.

A "RELATIVELY" OLDIE BUT GOODIE

Brian Trummel's Junior 2 may not be the most current buggy out there, but he has it nicely tricked-out. Brian's list of mods includes a complete set of ball bearings, a Novak Duster ESC and a Trinity Green Machine 2, and he uses an Airtronics Rival radio for control. In the near future, Brian intends to start what promises to be an illustrious racing career. Good luck and have fun!



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

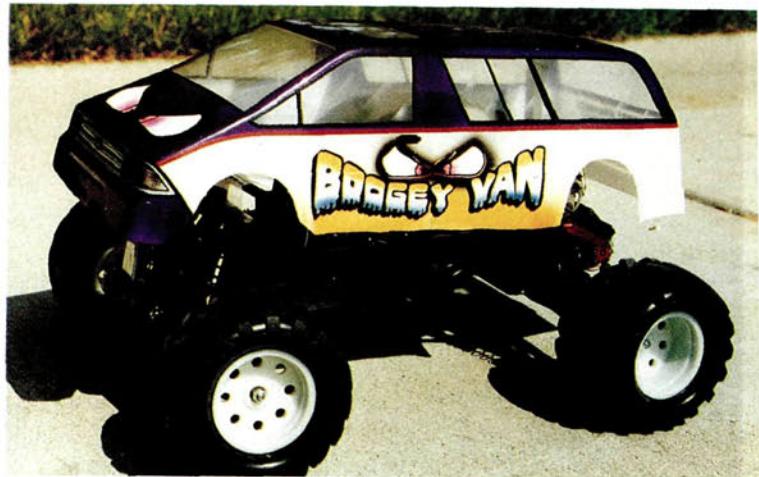


RICK'S OBSESSION

Rick Miller Jr. of Wareham, MA, sent us this photo of his MRC MT-10S. Rick's truck is equipped with a Futaba radio, receiver and servo, a DuraTrax DTX-4 ESC, a Trinity Green Machine 2 stock motor and a full set of ball bearings, and it's topped off with a trick paint job by Richard Muise of Motion Graphics. Rick's future mods include a set of Pro-Line tires, a Novak Polaris receiver, a Novak Hammer Pro ESC and a set of titanium turnbuckles. He intends to race it soon. Have fun!

MONSTROUS RIDE

John Jacobus sent in this shot of his most recent creation—the Boogey Van. The latest in transportation for all the creatures that go bump in the night, this modified Traxxas Stampede gives new meaning to the term "monster" truck. Powered by a Kyosho 360 Mega motor and controlled by a stock ESC and Futaba Sport radio gear, the van easily transports its ghoulish passengers from under John's bed to the nightly party in his closet.



DRAGSTER DEMON

Eleven-year-old Chris Booker of Wilmington, Kent, Great Britain, designed this awesome replica of Swiss driver Urs Erbacher's TA/FC. The chassis, brass wheelie bar and scale parachutes are all handmade. A narrowed Bolink rear end sits on a scratch-built flex-plate. An Astro Flight ESC controls a 7-turn single motor, and Chris uses a 3-channel radio system to control throttle, steering and chutes. The Protoform Trans Am body was modified and painted by Chris's dad.

Impressed with Chris's model of his funny car, Urs Erbacher asked Chris to make another one for his own collection of scale models.



VENGEANCE ON WHEELS

Matt Pateman of Placentia, CA, wrote in

to tell us about the race antics of the Calvin and

Hobbes team. It seems that Calvin, driving his Trinity EV-10, which features

a homemade short-track chassis, Trinity purple screws and aluminum hubs, was punted by Hobbes who was piloting his stock Associated 10L. Calvin learned that Hobbes was in league with Susie, who took great pleasure in watching Calvin lose to his furry friend. Calvin vowed revenge and was last seen in the company of Stupendous Man and Spaceman Spiff.

THE BIGGER THE BETTER

Because his $\frac{1}{10}$ - and $\frac{1}{8}$ -scale R/Cs were constantly getting hung up on the tiniest of obstacles, David Glassman of North Oaks, MN, decided to design this extra-large ride. This R/C jeep is more than 48 inches long and has a 30-inch wheelbase. The body (from a child's electric car) is secured to a frame that's custom-built out of 1-inch steel tubes.



The giant also features: 15x6x6-inch pneumatic turf tires; three motocross shocks; a roll bar; a trailer ball; and halogen headlamps and running lights. It's powered by a 5hp Briggs and Stratton Kart motor that's coupled to a Comet variable belt-drive transmission. The whole vehicle is wired to a 12V electrical system, and David uses Airtronics radio gear to control this beast.

In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



RCHTA National Model and Hobby Show

Hey, did you miss out on going to Chicago's world-renowned 1995 National Model and Hobby Show sponsored by RCHTA? Well, if you didn't get to see all the cool new stuff, rest easy you crazy hobbyist, because we're going to give you the best highlights of the show without your having to travel back in time; you know how messy that can be, and you usually forget a change of clothes.

PRO-LINE



Speed Hawgs

Convert your $\frac{1}{10}$ -scale stadium truck into a serious street machine with Pro-Line's new ZR-80 Speed Hawgs (part no. 1080; \$17.95). These tires feature an aggressive V-tread that's similar to the Goodyear Gatorbacks that are found on the ultra-mean Chevy Corvette ZR-1. For the utmost in speed and handling on asphalt, concrete and parking lots, bolt a set of these onto your ride, and hang on.

TEAM LOSI

Losi Has Gas

The wait is over. Team Losi has just released their gas truck, which will be sold exclusively through Horizon Hobby Distributors. The GTX is based on Losi's LX-T racing truck, and it's loaded with a ton of cool features, such as newly engineered suspension geometry; a tough, lightweight aluminum chassis with molded top brace; a new, linear brake system; a centrally located 75cc fuel tank with vibration-proof mount and a wide-mouth, flip-top lid; a

custom-molded laydown tranny; universal swing-shaft drives; and a sleek aerodynamic Lexan body. The truck is available with or without an engine, and there are pro and sport models. Part nos. and prices: LOSA0951 (GTX with TNT .12R PS)—\$459.95; LOSA0952 (GTX Pro with TNT .12R PS)—\$579.95; LOSA0953 (GTX Pro with TNT .12R Non-PS)—\$569.95; LOSA0954 (GTX Pro without engine)—\$449.95.



KYOSHO



Let's All Get a Little Nostalgic

At the show, top Kyosho agents from around the planet met to energetically discuss Kyosho's new product line for 1996. Participants got a close look at latest innovations, including Kyosho's new Nostalgic Series—the hit of the show. Present at the show were such notables as Kyosho consultant and founder Hisashi Suzuki (third from left), Kyosho president Aki Suzuki (fifth from left) and Great Planes' vice president Rick Piester (far left).

TRINITY Best Booth

Trinity president Ernie Provetti accepted the award for best-looking booth at the show. Trinity went all out this year with black display cases, plush black carpeting, purple A-frame construction and neon lights galore. Two gigantic motors (a Midnight and a Dirtinator) rotated on their shafts above the

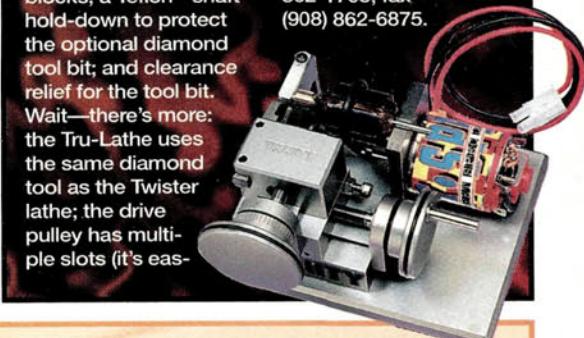


booth, and an enormous street spec stock car went round and round high above the display. Trinity/Team Losi drivers Brian Kinwald and Greg Hodapp signed autographs and gave racing tips.

Comm Down

Do you run modified motors? Well, if you do, you know the importance of regular maintenance. Keeping your comm in good shape is a top priority! Here's a hot item for you: Trinity's new Tru-Lathe. It features an integral on/off switch; fine pitch leadscrew for superb accuracy; 10 alignment pins/studs to maintain the correct alignment of the components; heat-treated, V-slot, shaft-support blocks; a Teflon® shaft hold-down to protect the optional diamond tool bit; and clearance relief for the tool bit. Wait—there's more: the Tru-Lathe uses the same diamond tool as the Twister lathe; the drive pulley has multiple slots (it's eas-

ier to cut slotted rotor arms); there's added clearance between the motor and feed wheel; it has a reverse-polarity-protection device (to prevent accidentally breaking the diamond bit); and it has a gunmetal gray finish. Whew!—that's a lot of stuff. The Tru-Lathe (part no. 4104) retails for \$225, and it comes with a carbide bit. For more info, contact Trinity, 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



THE HIT CORPORATION

These cells are a hit!

Agents representing The Hit Corporation of Japan showed me some of their new Powers Max Panasonic cells. According to Motoyuki Morita, general manager of international operations, these cells are capable of super-high performance if they are trained by this specific break-in method: charge at 3.5 to 4 amps, then discharge at 20 to 25 amps. Perform this once a day, repeating the process five to 10 times every two or three days.

When trained this way, these cells provide higher voltage than typical P-170 cells, but they have greater capacity than typical 1700mAh SCRC cells.

Powers Max cells are distributed in Japan by The Hit Corporation, 29-16, Yashio 7-chome, Yashio,

Saitama 340. 81-489-98-5439. All export inquiries should be made to Motorex Corporation, 3-1302, Tsukushino 3-chome, Abiko (Chiba) 270-11, Japan. 81-471-84-4393.



TAMIYA

Pony Power Pounds the Pavement

Tamiya has finally introduced an American muscle-car body to fit their race-proven TA02 4WD chassis. The car is sold as a complete kit (part no. 58169; \$285), and it includes a patriotic graphics sheet that lets you replicate the "Hacker Brothers" Mustang Cobra R right down to the stars and stripes. Those wimpy European sedans better move over 'cause this 5.0 beast takes no prisoners!



Rockin' Renault

Tamiya has introduced this really cool-looking Renault Alpine A110 (part no. 58168; \$234). It's based on their new, tiny M02 chassis (the one that's used on Tamiya's FWD Rover Mini Cooper). Unlike the Mini, the Alpine is rear-wheel-driven and has front-wheel steering, which makes it easier for beginners to drive. The Alpine also includes a set of great-looking, six-spoke wheels that have a slightly larger diameter than the Mini Coop's wheels, and that gives the Alpine an edge on top speed.



HPI



HPI's ESC is A-OK

HPI has just released a compact, lightweight Pro ESC (part no. 300; \$209), and it's guaranteed to light a fire under your car's tires. This hot ESC features: highly efficient digital circuitry for low loss and longer run times; super-smooth adjustable current limiter; user-friendly digital programming; adjustable braking; super-low 0.0015 on-resistance; and 600A short-pulse current. For more information, contact HPI at (714) 837-3250.

AWESOME!

The Pointblank Vampyre is 1996's Hottest ROAR Legal Stock Motor for Buggies & On-Road Racing

The Vampyre Features All The Latest Epic Technology Like:

Laydown Brushes for more brush overlap and rpm's

Short Slotted Armature™ has less mass, better cooling, more rpm's

5.2v. Wet Magnets are the most powerful and thickest available, they produce the strongest possible magnetic field for maximum power

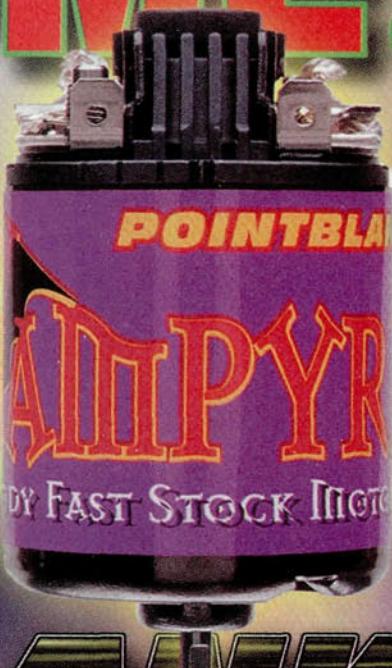
1.3mm Thick Can improves the magnetic field produced by the 5.2v Wet magnets by reducing magnetic leakage through motor can.

Internal Flux Collector™ balances magnetic field at the open end of the motor can, reduces magnetic leakage

Available only at your favorite R/C hobby shop!

P360, Normal Rotation, \$40.00

P370, Reverse Rotation, \$40.00



POINTBLANK™

Pointblank is a subsidiary of Trinity Products Inc. 1901 E. Linden Ave #8, Linden, NJ 07036, Ph: 908-862-1705, Fx: 908-862-6875

PARMA**Really Rad Mod Rod**

Check out this bad boy! It's Parma's new Pro '37 Chevy hot rod (part no. 15130; \$129.95). The kit includes Parma's highly detailed Chevy motor kit, chrome spoke



wheels with high-grip foam tires, realistic headlights and a cool-looking, two-piece drag wing with parachutes. Build yours up as a pro mod dragster or as a wild-looking street

machine; the choice is yours. The kit includes a colorful graphics sheet so you can trick it out like the pros. This hot rod isn't all show and no go, though; the chassis is made of high-quality fiberglass and includes an aluminum motor pod and ball diff. So what are you waiting for? Go burn some rubber.

BOLINK**Bolink Mini Cup Equals Major Fun**

New from Bolink is this Mini Cup stock car (part nos. BL1351-C—Chevy body; BL1351-F—Ford body; \$99.95 each) that's patterned after the 1/2-scale stock cars that are seen on ESPN's Saturday night "Lightning Shows." The R/C Mini Cup cars use a smaller

version of the proven Digger and Legend chassis design. The Mini Cup cars are about the size of a typical 1/12-scale car, but they don't require miniature radio gear; standard radio gear will fit with no problem. The kit fea-



tures an independent, coil-spring front suspension and ball diff and Oiilite bushings throughout, and it is available with either a Ford or a GM Lexan body.

MRC**MRC Drops the Bag**

MRC's director of product development, Don Boyce, demonstrated the ruggedness of the MT-10M by dropping it from a 16-foot scaffold. He performed this stunt every hour on the hour, and each time the truck drove away un-scratched. MRC is building a reputation for torturing their trucks; first they slammed their World Scale Thunder King monster truck repeatedly into a cinder-block wall—now this! What's next? Are they going to run over one of their trucks with a 20-ton, 18-wheeler?

**FUTABA****Futaba's Funked-Out PCM**

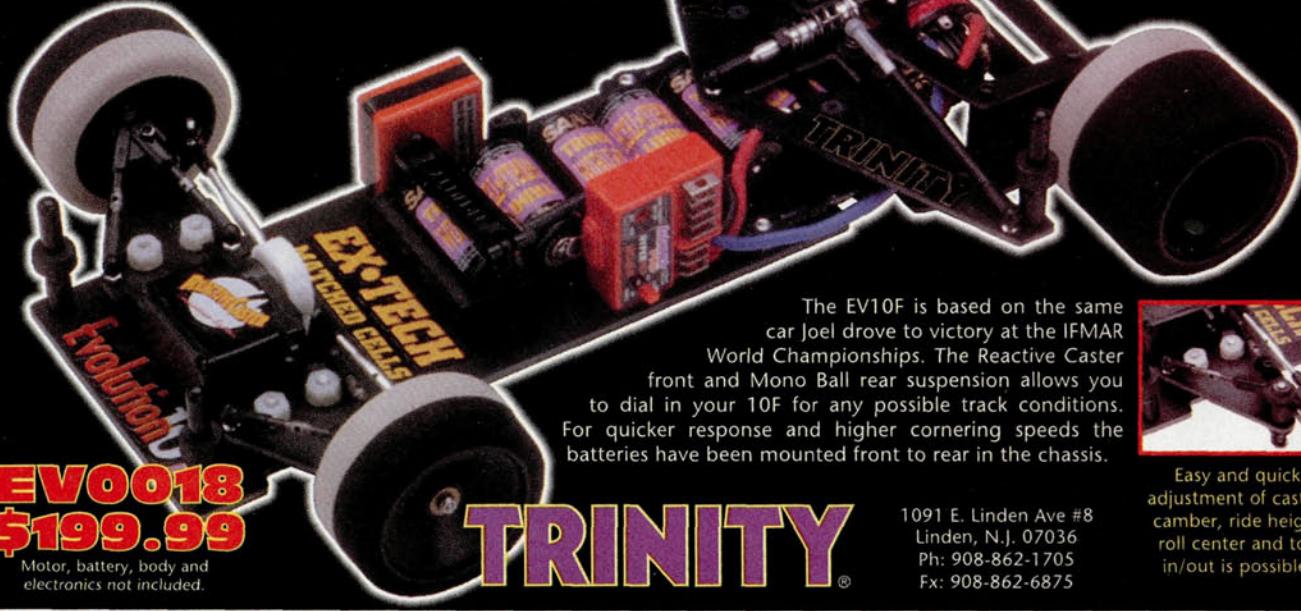
Futaba will release what is probably the most advanced FM PCM radio available for R/C cars. The new T3PJ is loaded with so many hot features that it would take pages to list them all. Here's a quick look at some of the features of this high-tech radio system: LCD display with six edit keys; six-model memory with model identification; stopwatch

with a 99-lap recall; all electronic trims; assignable trim tabs; right- or left-hand operation; direct servo control; low-battery alarm; programmable mixing; steering and throttle dual rates with exponential.



EVOLUTION 10F™

The Fiberglass Version Of Joel Johnson's IFMAR World Championship Winning EV10!



The EV10F is based on the same car Joel drove to victory at the IFMAR World Championships. The Reactive Caster front and Mono Ball rear suspension allows you to dial in your 10F for any possible track conditions. For quicker response and higher cornering speeds the batteries have been mounted front to rear in the chassis.

EVO018
\$199.99

Motor, battery, body and electronics not included.

TRINITY®



Easy and quick adjustment of caster, camber, ride height, roll center and toe in/out is possible.

1091 E. Linden Ave #8
Linden, N.J. 07036
Ph: 908-862-1705
Fx: 908-862-6875



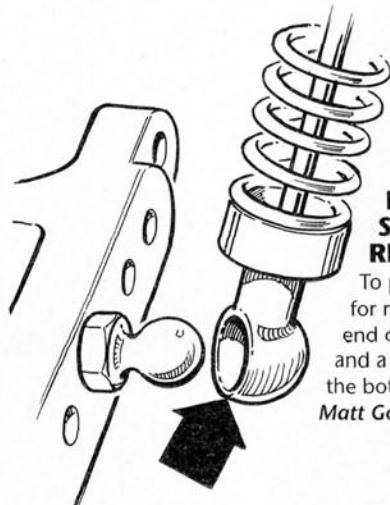
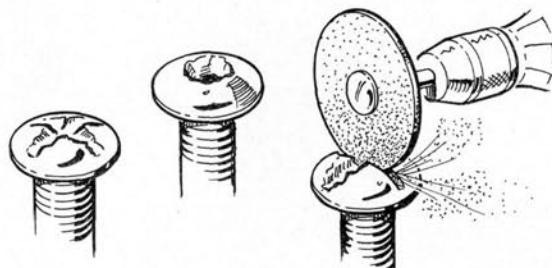
PIT TIPS

by Jim Newman

EASY SCREW REMOVAL

If the slot has been stripped out of the screw head, use a smear of First Try compound (from the auto parts store) on your screwdriver. If that fails, cut a new screwdriver groove with the grinding disk on your Dremel tool. Be sure to use safety glasses while you do this.

Matthew Hildreth, Grayslake, IL



RC10 EZ SHOCK REMOVAL

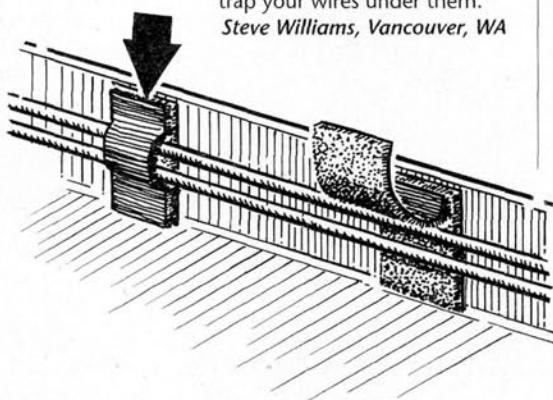
To pop your shocks off for rework, screw a ball end onto the rear A-arm and a ball socket onto the bottom of the shock.

Matt Goette, Omaha, NE

TIDY WIRES

To make your car easier to service and to prevent some interference, stick pieces of Velcro®-brand fastener to the insides of your chassis tub, then trap your wires under them.

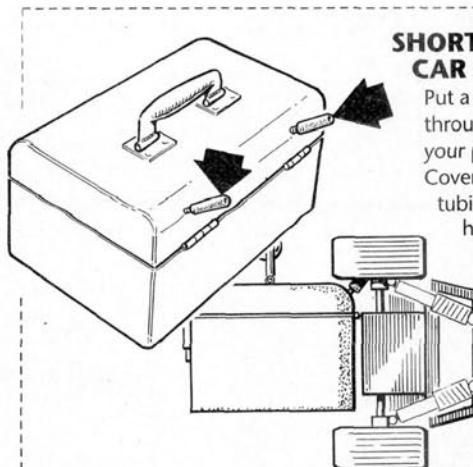
Steve Williams, Vancouver, WA



LOST-WINGS CURE

If the wings tend to slide out of your RC10 aluminum mounting tubes, bend a very slight curve in them (exaggerated here for clarity). The added friction against the wing wires holds them firmly in place.

Jimi Kim, Fountain Valley, CA



SHORT-HAUL CAR CADDY

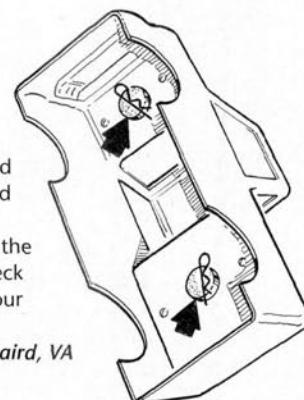
Put a couple of bolts through the corners of your pit-box lid as shown. Cover the threads with fuel tubing or auto vacuum hose. You can hang your car on the side of the pit box while you carry the box in one hand and your transmitter in the other.

Bill Brice, Delta Junction, AK

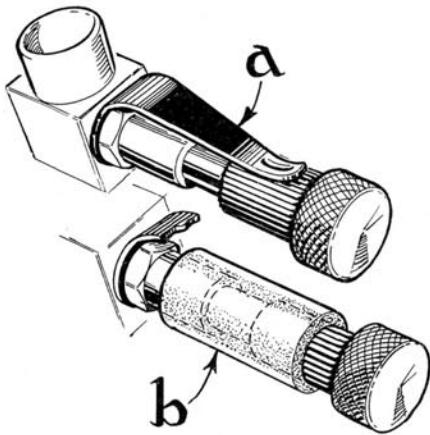
LOST CLIPS—NO MORE

To avoid losing body clips, use PFM or Shoe Goo to glue small, round magnets under each end of your body shell, and place the loose clips on the magnets. Be sure to check the glue's reaction to your paint first.

Dick Swartwout, Penn Laird, VA



Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



FIELD NEEDLE FIX

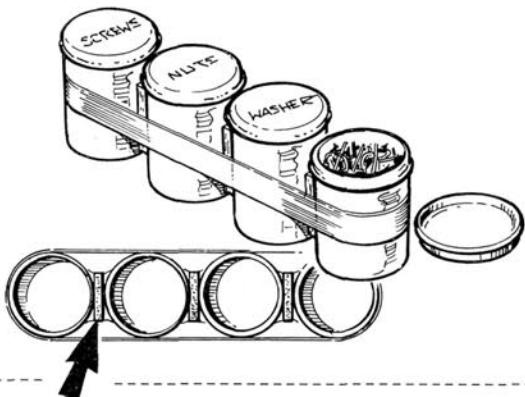
If the spring ratchet (a) breaks off your needle valve, slip a tightly fitting piece of rubber fuel line (b) over the needle and thread; the friction will lock the setting into place.

*Ashley Zaragoza,
Sylmar, CA*

FREE PARTS CADDY

To make a useful storage container for your pit kit, use silicone caulk or PFM to glue plastic film containers together, and put $\frac{1}{8}$ -inch (3mm) balsa spacers between them. Wrap nylon strapping tape around the assembly, then use a permanent Magic Marker to identify the contents.

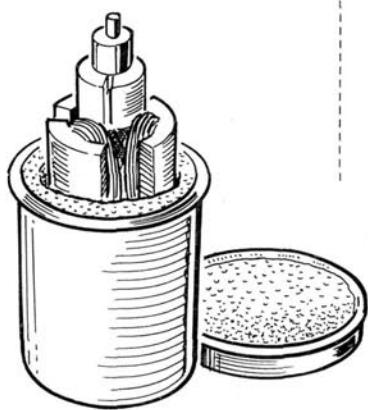
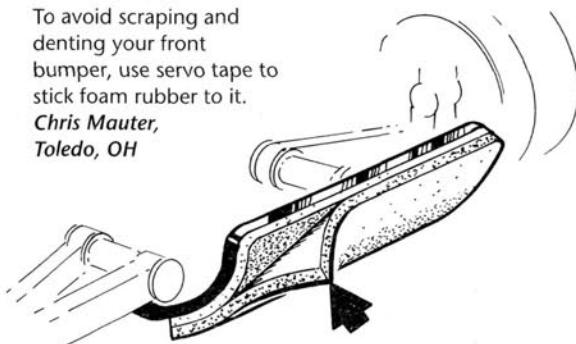
Danny Cox, Dublin, CA



SPONGY BUMPER

To avoid scraping and denting your front bumper, use servo tape to stick foam rubber to it.

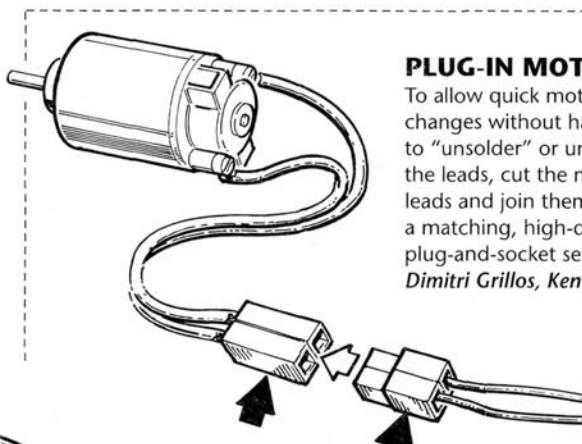
*Chris Mauter,
Toledo, OH*



PADDED-ARMATURE TOTE

To safely store your serviced armatures in your pit kit, use a 35mm-film container packed on the inside with thin foam rubber.

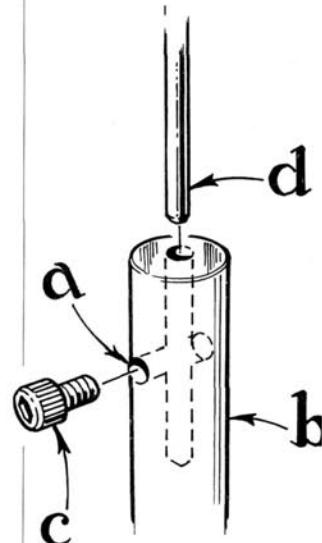
*Martin Hohenadler,
Graz, Austria*



PLUG-IN MOTORS

To allow quick motor changes without having to "unsolder" or unscrew the leads, cut the motor leads and join them with a matching, high-quality plug-and-socket set.

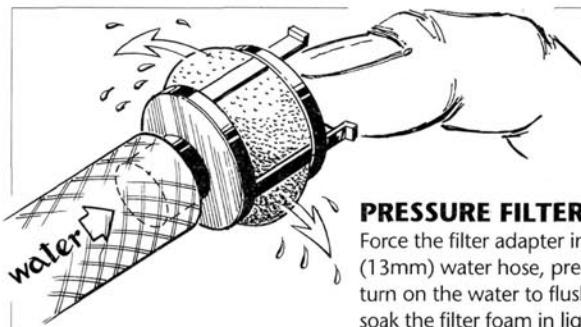
Dimitri Grillos, Kent, WA



WING-WIRE SECURITY

Drill holes (a) through the wing wire posts (b); tap a suitable thread in the holes; then use a setscrew (c) to clamp the wires (d) into place.

Ryan Hanlon, Dallas, TX



PRESSURE FILTER WASH

Force the filter adapter into the end of a $\frac{1}{2}$ -inch-diameter (13mm) water hose, press lightly on the top to hold it, then turn on the water to flush out the dirt. Dry thoroughly, then soak the filter foam in light oil.

Chris Tolley, Long Hanborough, Oxfordshire, England

WHAT'S

new

NOVAK**Tempest**

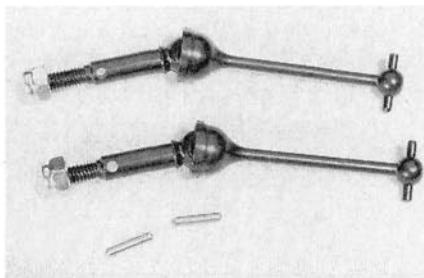
This ESC's revolutionary circuitry provides smoother throttle response, quicker acceleration, longer run times, an increased radio range and a cooler operating temperature than conventional controls. It offers six HYPERFET

II drive transistors; Super-Flex

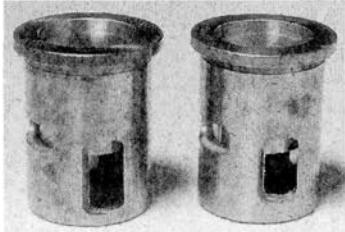
12-gauge wire; a high-current rating of 420 amps; a 210A brake circuit; One-Touch Set-Up™; the CLC II current limiter; and Novak's heavy-duty BEC.

Price—\$199 to \$219 (estimate).

Novak Electronics, 18910 Teller Ave., Irvine, CA 92715; (714) 833-8873; fax (714) 833-1631.


THUNDER TIGER
Piston/Sleeve
Assemblies

New for O.S. CZ-R and CZ-Z engines, these sleeves are of true ABC construction; they aren't just nickel-plated. The combination will allow you to upgrade your O.S. engine to ABC technology at a lower price, and that will make your engine last longer.



Part nos. and prices—AN0546 (for Thunder Tiger Pro-12B and O.S. CZ-R), \$39.99; AN0547 (for Thunder Tiger Pro-12BZ and O.S. CZ-Z), \$49.99.
Thunder Tiger USA, 2430 Lacy Ln. #120, Carrollton, TX 75006; (214) 243-8238; fax (214) 243-8255.

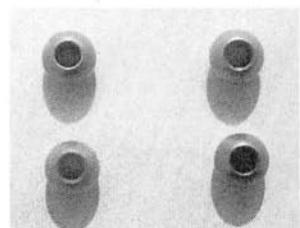
TEAM LOSI**Aluminum Hard-Coated Suspension Balls**

These new precision-machined, hard-anodized, aluminum suspension balls replace the standard steel balls used in the bottoms of all Team Losi shocks. At $\frac{1}{3}$ the weight of the originals, these lightweight balls are the easiest way to reduce weight in any Losi vehicle. Each package includes a full set of long-lasting balls for all four shocks.

Part no.—A-9940;

price—\$3.95.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.

**MIP****CVDs for TA02 and YR-4**

These two-time world-championship winning CVDs are now available for narrow and wide Tamiya TA02 sedans and the Yokomo YR-4. Precision-machined of alloyed steel that has been hardened for strength, they're finished with a black-oxide, rust-prevention coating. They also offer nearly zero backlash and positive acceleration, and they don't bind. All the parts are sold separately, so they are completely rebuildable, and installation doesn't require modifications.

Part nos. and prices—1098 (narrow, for TA02 front), \$32; 1101 (wide), \$30; 1104 (for TA02 and TA02W rear), \$30; 1106 (for YR-4), \$35.

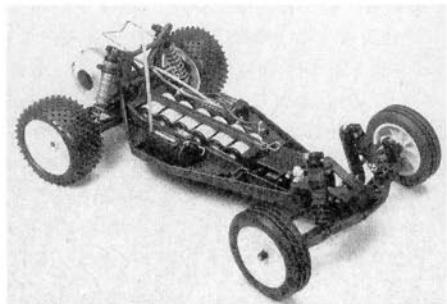
MIP, 746 E. Edna Pl., Covina, CA 91723; (818) 339-9008; fax (818) 966-2901.

TEAM ASSOCIATED
RC10B2

This completely new design features: a molded composite chassis with an adjustable wheelbase; bolt-on front assembly; new Stealth transmission with a larger-diameter diff; new, light, universal axles; large, rear, hub-carrier ball bearings; rear bulkhead that's molded into the chassis; molded composite rear shock strut; longer suspension arms and front shocks; a new Mirage-style Lexan body; and a new adjustable servo-saver system.

Part no.—9000; price—\$340.

Team Associated/Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626-1403; (714) 850-9342; fax (714) 850-1744.


TEKIN
BC110L

This new charger features 0.5-10A adjustable output current; high-performance linear current output; fully automatic peak-detection operation; compact, light construction; precision components; calibrated dial for accurate current adjustments; external volt/ammeter jacks; 33KHz digital switching circuitry for cool, safe operation and high performance; and easy, one-button operation. It also works with a variety of power supplies.

Part no.—3000; price—\$110.

Tekin Electronics Inc., 940 Calle Negocio, San Clemente, CA 92673-6201; (714) 498-9518; fax (714) 498-6339.



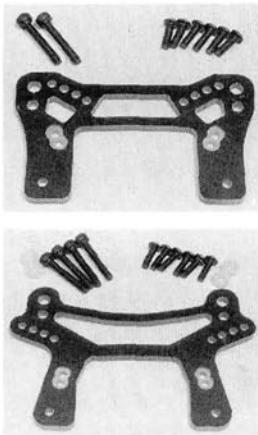


TRINITY Monster Hauler Bag

This new car-carrying bag is made of heavy-duty canvas and comes with hand and shoulder straps. It features pockets on the inside for batteries and tools, plus compartments on each end for storing tires, transmitters, etc. It's available in black with Trinity purple trim.

Part no.—9075; **price**—\$49.99.

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



FACTORY WORKS Front and Rear Shock Towers for the Yokomo YR-4

These computer-cut shock towers are made of $\frac{1}{8}$ -inch-thick, black-matte, G-10 fiberglass. They feature: four upper shock-mounting positions to allow you to tighten or loosen either end of the car without having to change shock oil or spring load; an optional upper-link-mounting hole; and counterbored holes for the spring and screw clearance. Included are 3mm socket and button-head screws of the correct length.

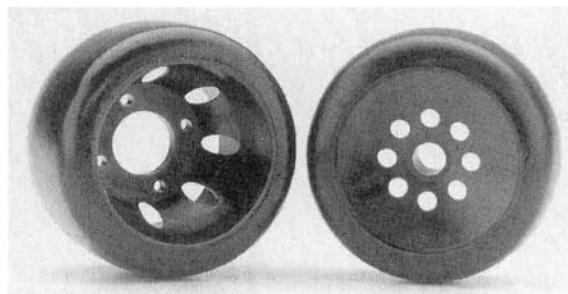
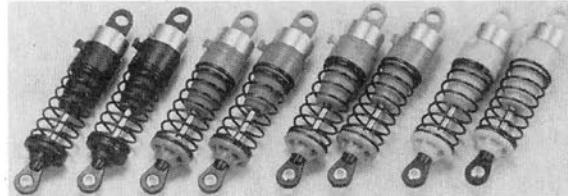
Part nos.—2030 (front), 2031 (rear); **prices**—\$12.95, \$13.95. Factory Works, 505 N. Smith 3105, Corona, CA 91720; (909) 735-5516.

KYOSHO Color Shocks

These triple-sealed, oil-filled, coil-over shocks feature a light Kelron™ body, a leak-proof aluminum cap and tapered pistons that reduce wear and binding. They're available in three sizes and colors.

Part nos.—KYOC6551 (short, yellow), KYOC6552 (medium, yellow), KYOC6553 (long, yellow), KYOC6554 (short, green), KYOC6555 (medium, green), KYOC6556 (long, green), KYOC6557 (short, blue), KYOC6558 (medium, blue), KYOC6559 (long, blue); **price**—\$19.99.

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.



TRC New Compound Capped Tires

These capped tires are available in two new compounds—Purple and White. On short-concrete and asphalt tracks, the long-lasting Purple compound provides fast starts and great traction. The medium-firm White compound's traction characteristics fall between those of the Gold and Silver compounds, but the White lasts longer. Both tires are available in a variety of sizes and widths.

Part nos. and prices—4467 (purple, front), \$23; 4567 (purple, rear), \$25; 4463 (white, front), \$23; 4563 (white, rear), \$25.

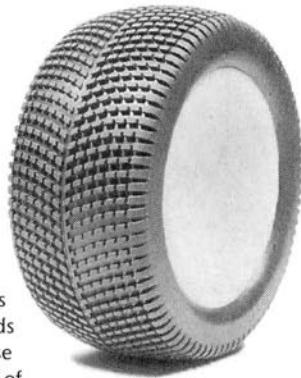
Total Racing Connection Inc., 210 Charter St., P.O. Box 1058, Albemarle, NC 28001; (704) 982-0507; fax (704) 982-0672.

PRO-LINE Rally Hawgs

Designed to provide serious grip on all kinds of terrain, these tires are made of the long-lasting XTR compound, and they feature a directional tread pattern with aggressive square studs that will hook up on grass, dirt, sand and pavement. Use them to transform your off-road buggy into a mean, all-terrain machine.

Part nos. and prices—8061 (rear), \$12.50; 8155 (front), \$10.50.

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.



MAXTEC DEVELOPMENT Tuned 24-Degree Stock Motor

This motor has been individually tuned to suit competitive touring cars. It features capacitors, specially tuned spring tension and chemically treated V-slot silver racing brushes, and every motor is packaged in a protective case that also contains its TURBOdyno results. This motor is also available to suit your F1 car.

Price—\$40.

Maxtec Development, 3740 Overland Ave., Ste. B, Los Angeles, CA 90034; (310) 815-0251; fax (310) 815-0253.



Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by **Radio Control Car Action** or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in **Radio Control Car Action**. Manufacturers! To have your products mentioned here, send press releases to **R/C Car Action**, What's New, 251 Danbury Rd., Wilton, CT 06897.



TROUBLE SHOOTING

by George M. Gonzalez

JUICE-ROBBING MONSTER

I'm having a little trouble with my R/C truck. I have a Traxxas Sledgehammer, and I use an Airtronics RV2S radio system and a Novak Duster ESC. I recently purchased a Sanyo 1500mAh sport pack to

increase my run time from 1 minute to something more reasonable. I also have a Trinity Slot Machine II. So far, I haven't seen any improvement in run



time. Would a Novak receiver help add some run time? If not, what do I need to do so I can enjoy my truck more? Please help me. I'm beginning to think that R/C racing is just a big waste of money.

DEREK CLARKE
Wise, VA

Derek, you forgot to mention what kind of charger you're using. It sounds as if you have some good equipment, and the Slot Machine II is a very efficient motor. I suspect that your charger isn't giving your battery a good zap. It's either that, or your motor's brushes are worn to the shunts,

or you're using some pretty tall gearing. Have your battery charged on a good charger (preferably a peak-detection charger), and check the results. A properly charged battery will be slightly warm to the touch—not cold, not blazing hot. If there's no increase in run time, clean your motor well with motor spray and a comm stick, and replace the brushes if necessary. If this doesn't do the trick, drop down a tooth or two on your pinion gear. Also, installing a Novak receiver won't improve your run times. Oh, and don't give up; we need you!

NEED FOR SPEED IN NEW JERSEY

I began racing stock truck this year at my local dirt-oval track. I recently bought a Traxxas SRT race truck that has a 2.72:1 transmission ratio. The truck handles very well in every way but one: it's the slowest truck on the track. No matter which gear ratio or motor I use, my truck always gets passed on the straightaway. On off-road tracks, it runs with the best—no problem. The truck has full bearings, a Novak Hammer Pro ESC, Lite-speed connectors and a Traxxas radio and servos.

I let my friends who race RC10Ts and XXTs run the truck, and they're at least one or two laps slower. I don't think it's my driving. The major difference between my truck and theirs is that my truck has a lower final gear ratio.

My question is this: is the transmission ratio of 2.72:1 slower than other

transmissions with ratios of 2.6:1 or higher? I called Traxxas, and they said that I should be very competitive with the setup I have.

DENNIS J. LANGE
Browns Mills, NJ

Hey, Dennis, the Traxxas SRT is an extremely competitive truck—especially in the dirt-oval class. The SRT's lower final gear ratio is better-suited to modified motors; however, you can gear it for stock motors just as you can with the Losi or Associated gearboxes. There are several reasons why you could be having trouble: your batteries could be shot, or they might not be getting charged properly; your

motor could be dirty or worn; your bearings could be dirty, which could cause excessive friction; your tires might not be getting enough traction; or your tranny could be overgeared or undergeared.

You mentioned that your SRT is fast on an off-road track and slow on an oval track; your truck could be undergeared. The SRT comes with a 78-tooth and a 84-tooth spur gear. Use

the 78-tooth spur gear for stock motors, and start with a 22-tooth pinion. This gives your truck a 9.64:1 final gear ratio, which is a good starting point. You could go down a tooth or two for a short track or up a tooth or two if the track has long straightaways. Have you cleaned your bearings, serviced your motor, checked your batteries? How about some new tires?—ones that the fast guys use.

LAP COUNT

SUN MON TUE WED THUR FRI SAT

SUN	MON	TUE	WED	THUR	FRI	SAT
✓	✓	✓	✓	✓	✓	



you have technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.



BATTERY-PACK QUERIES

I'm relatively new to this hobby, and I have some questions about battery-pack building. Do I need to solder the battery bars onto the top and bottom of each two cells? Can I solder the wires (I use connectors) to cells that have battery bars on them? Do I need to bend

the battery bars as shown in *Car Action's* article (May '95)? By the way, you have a great magazine. It was because of your magazine that I got started in the hobby.

Cyberstrz@aol.com

I always recommend that new hobbyists buy pre-assembled battery packs because putting them together isn't as easy as it looks. You need a good-quality soldering iron to do the job well, and it's very easy to damage the cells in the process. Keep in mind that many battery-matching companies offer race-quality cells in pre-assembled stick packs, so there really isn't

any need to build them yourself unless you want a side-by-side configuration. Most die-hard racers prefer the side-by-side configuration because stick packs use shrink-wrap, which causes heat buildup and increases the weight slightly. Also, racers prefer to build their own packs because they can use high-quality battery bars that offer less resistance than the spot-welded battery tabs used on most stick packs.

I've seen racers remove the shrink-wrap and glue the endcaps to the battery, which allows the cells to "breathe" better, and it reduces the weight. Also, race-quality cells (matched) don't offer any significant advantage over quality sport packs unless you have a good-quality peak-charger. If you must build your own packs, follow the directions in our May '95 article entitled "Building Battery Packs."



JIM NEWMAN
95

RACING ON A BUDGET

I love your magazine. I'm 12 years old, and I just started R/C racing. I have a Traxxas Rustler. It had a mechanical speed controller, but it broke. I want to buy an electronic speed controller, but I'm on a budget. Is the Traxxas XL-1 ESC any good?—if not, which one

is? Keep up the good work.

*A.J. HENLEY
Yuma, AZ*

The Traxxas XL-1 is a good reversing ESC, as long as you don't plan to use a modified motor. The XL-1 is a large unit, so you'll have to mount it on the Rustler's shock tower. For a few dollars more, you could pick up a Novak Rooster, which will give you smoother response and longer run times because of its high-frequency switching. The Tekin Rebel is also worthy of your consideration, and it will handle modified motors.

NITRO-POWERED RC10CE?

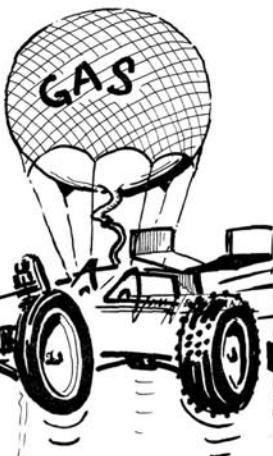
Hi, I'm 12 years old, and I bought a RC10CE (with a Stealth tranny) about 6 months ago. Since then, I've had the chassis purple-anodized and the shocks blue-anodized. I was wondering if I could convert it to gas. If I could, what size engine would I need, and would I need to gear it a special way? Please help. P.S. I love your magazine.

*MICHAEL DAS CALDAS
West Covina, CA*

Michael, how are things on the West Coast? I used to live in Arcadia not too long ago, so we might have rubbed fenders at one point or another. On to your question: A-Main

Racing makes a conversion for the RC10T racing truck, but I'm told that it doesn't work well on the buggy. Some of the problems you'll run into are: the rear suspension arms are too short, and they'll cause the tires to

rub against the conversion kit's extra-large rear-axle carriers; the body won't fit; and it will be very difficult to gear because of the smaller-diameter wheels and tires. If you really want a nitro buggy, check out some of the 1/10-scale 4WD offerings, such as,



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the Kyosho Inferno 10, the Thunder Tiger Challenger and the OFNA Pirate 10. Traxxas also makes the Nitro Buggy—a 2WD buggy that uses their new TRX-12 engine. Good luck with your nitro quest.



Understanding Gear Ratios



GEAR RATIOS, spur gears, pinion gears, mesh, pitch, teeth, nylon, aluminum and hardened steel.... Which gear do I change for bottom-end power?

Which do I change for top-end speed? How will changes affect run times?

It's amazing how many factors are associated with just two simple gears—the spur gear and the pinion gear. This month, I hope to simplify the spur gear/pinion gear phenomenon. To understand it better, you must know a few things.

- Manufacturers use aluminum, hardened steel and nylon to make gears.
- On off-road cars and trucks, the spur gear is the large (usually plastic) gear that's attached to the transmission; on on-road pan cars, it's attached directly to the rear axle.

the difference in sizes of the spur gear and the pinion gear.

- "Mesh" refers to how the two gears come together.
- "Pitch" refers to the slope of the sides of each individual gear tooth.

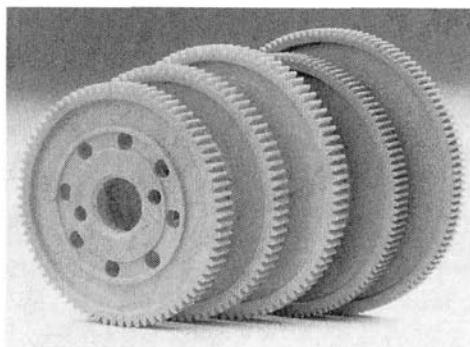
GEAR RATIOS

Now that you have a handle on the basics, let's take a look at gear ratios. There's really no mystery. To figure out your gear ratio, simply divide the number of teeth on your spur gear by the number of teeth on your pinion gear, e.g., if your spur gear has 50 teeth and your pinion gear has 25, divide 50 by 25—a 2:1 ratio. For every two rotations of the armature or crankshaft in the motor, the rear wheels of a direct-drive car spin once, hence the 2:1 ratio. On off-road cars, the ratio is a little more difficult to figure

spur/pinion ratio by the ratio of the transmission.

WHEN DO YOU CHANGE YOUR RATIO?

So, how do you know which gear to change and when? If you are a beginner, do not change the spur gear; run the one

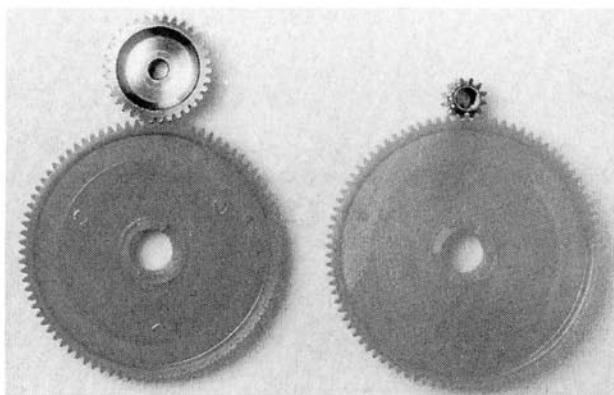


Spur gears are usually made of nylon or nylon composite.

that came with your vehicle, and concern yourself only with the pinion gear. If you need more top-end speed, use a pinion gear with more teeth; if you need more bottom-end torque to get out of tight corners, use one with fewer teeth.

Don't gear too high (i.e., use a pinion gear that's too large), because

Here are two classic examples of overgearing and undergearing. The pinion and spur gear on the left exhibits overgearing. With this ratio, you'll have no bottom-end power, and you'll probably cook your motor. The example on the right is undergeared. With this ratio, your car will accelerate and reach its top speed too quickly, and you'll have no top-end speed. Find a happy medium.



- On an electric motor, the pinion gear is attached to the armature; on a gas engine, it's attached to the clutch bell on the crankshaft.
- "Gear ratio" refers to

out because of the additional gears in the transmission; transmissions have ratios of their own. To figure the ratio of a "gearbox" car, you'll need to multiply the

that causes excessive heat buildup in your motor and shortens its life. The closer the gear ratio is to 1:1, the harder it is for the motor to spin the rear wheels. This causes the

motor to draw more current from the battery, and that means more heat, less run time and shorter motor life.

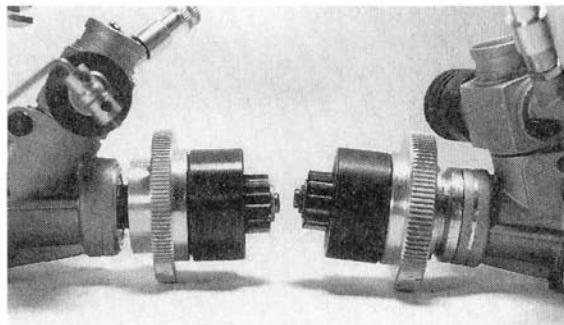
If you gear too low, your run times will be exceptional, but you won't have any top-end speed, and you'll probably spend most of your

time spinning your wheels. To find out how changing gears will affect your car, buy two pinion gears: one with one tooth less and one with one tooth more than you currently run. Try each gear with a newly charged pack, and check the results. With a larger pinion (more teeth), top speed should increase and run times should decrease. A smaller pinion will increase run times and bottom-end punch, but top speed will decrease.

WHAT DOES "PITCH" MEAN?

When you buy new gears, you'll need to know the gear pitch that your vehicle uses. In most off-road cars and trucks, the gears have teeth that are at a 32 or 48 pitch. On-road cars use 48 or 64 pitch. Gear manufacturers determine gear pitch by the number of teeth per inch, e.g., a 32-pitch gear has 32 teeth per inch, a 48-pitch gear has 48 teeth per inch, etc.

To better understand pitch, draw three triangles of the same height. Make the base of the first one fat and call it 32 pitch, make the next one thinner and call it 48 pitch, and make the next one still thinner and call it 64 pitch. Each of these triangles represents a single gear tooth. Notice that the skinnier the triangle, the steeper the angle of its sides; the steeper the angle, the higher the pitch. Also notice how large the base area of the fat triangle is compared with that of the skinnier ones. The larger this area, the less likely you'll be to strip the gear.

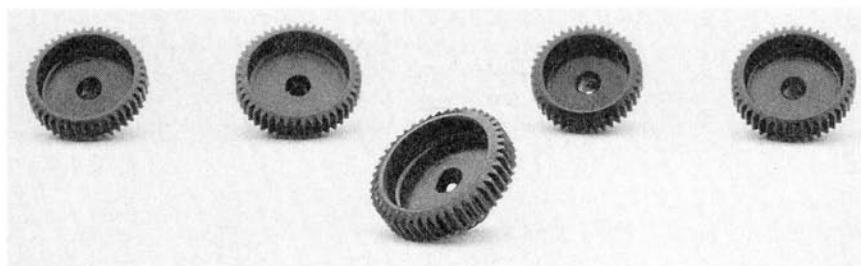


Pinion gears on gas engines are usually built directly into the clutch bell.

PROPER PINION SELECTION

Of what material should pinion gears be made? First, you need to understand why different materials are used.

possible gear and toss it after a few runs. If your goal is simply to make it around the track without crashing, a lighter gear won't help you, so stick with the steel gears, and



Pinions are usually made of aluminum or hardened steel. If weight is a major concern, go with aluminum. For greater longevity, stick with steel.

So why don't all cars use 32-pitch gears? The lower the pitch, the less smooth the gear mesh, and that makes the power transition from the motor to the rear wheels jerky. This is especially important in on-road cars, which use the highest pitch possible (64) to achieve ultra-smooth power transfer. So why not use high-pitch gears in all cars? Off-road cars and trucks do a lot of hard acceleration from low speeds in very high-traction conditions, and they take quite a bit of pounding and abuse that would possibly strip a high-pitch gear. Basically, off-road gears need to be a bit "meatier."

- Steel is the strongest, the heaviest and the cheapest.
- Aluminum is the lightest, but it's softer and more easily stripped.

save your money for other items.

REMEMBER

- Only change the pinion gear.
- Beginners should stick with less expensive gears and only go up or down one or two teeth at a time.
- A larger pinion gear (fewer teeth) means more top-end speed but less run time.
- A smaller pinion gear (less teeth) means less top-end speed, more bottom-end punch and more run time.

So what's the big deal about weight? A lighter pinion gear will lower the rotating mass, and that makes the car quicker off the line and faster on the top end. It also means the motor will slow more quickly, and that helps with braking. Basically, a heavy pinion gear acts like a flywheel on a full-size car or motorcycle.

If you're bigtime into racing, you probably want to run the lightest

I hope this helps you out. If you have any questions you would like answered, drop me a note. It's important that we know what you need. ■

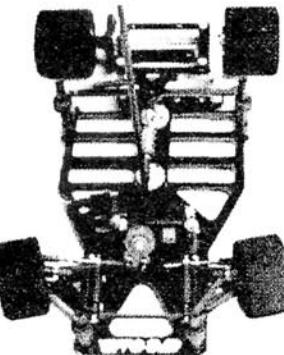


This year we'd like everyone to have as much fun as we did in '95.

Just a few of our wins from 1995:

**Oval Masters, Lake Whipp., FL
Cam World 600, King, NC
The Majors, Indianapolis, IN
Winterfest, Dominguez Hills, CA
Cleveland Indoor Champs, OH**

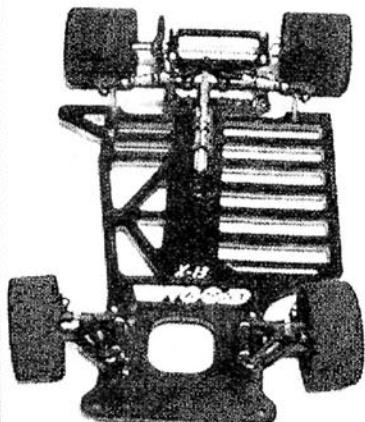
Cyphoon



1995 US Indoor Modified Champion

"I like the cars so much, I bought part of the company." Mike Blackstock

X-13



1995 U.S. Oval Masters Champion

Also available:

- ◊ Hurricane 1/10 On-road Car
- ◊ X-12 1/12 Oval version of X-13
- ◊ X-13/10L Conversion Kits
- ◊ Controlled Susp. (CS) L/R Drive Kits

We've moved! New Ph# & address.

Wood Racing, Inc.

37601 Dartmouth Dr., Sterling Hts., MI 48310
810-268-5005 Fax 810-939-6227
Now distributed by Competition Products, Great Planes, & ERI
Send \$3 for complete catalog.



EVERY ONCE in a while, I come across an outstanding, low-cost R/C tip that saves me time or money, or just plain makes my life easier. It may be something that I've created in my secret underground laboratory. I may have seen a fellow enthusiast using an unusual maintenance technique in the pits at a local, regional, or national race.

Sometimes, my tips

are the results of brainstorming sessions with racers who had the same problem. When I discover one of these gems, I file it away for future testing, and when I'm certain that it really will work, I share it with you. This month's tips have all been used, abused and torture-tested by my friends. They've worked for us, and I'm sure that you'll find something useful here, too!

Linkage Stick-O-Rama

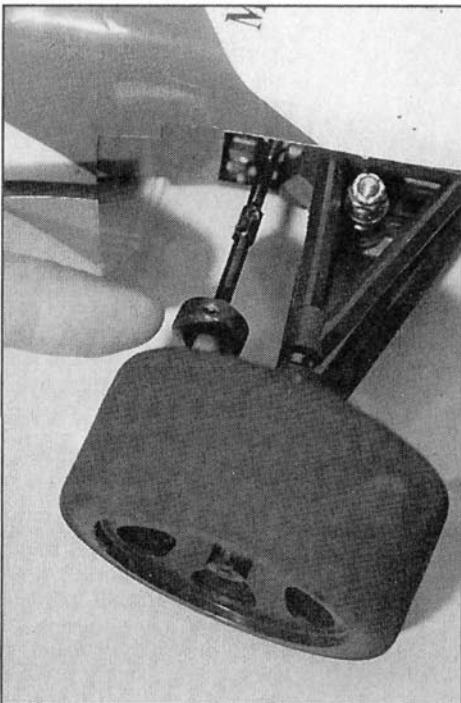
I occasionally come across a mechanical problem that just defies solution. This tip came out of weeks of attempting to fix the steering linkage on my HPI* F1 car. From time to time, the steering linkage would stick in the full-right or full-left position—usually in the middle of a qualifier, when the servo would be overextended because of the linkage geometry.

My options were limited because of the servo-mounting system and the size of the servo. I tried to mount the servo farther forward, but then the linkage interfered with the mounting ears. Moving the servo farther back allowed the wheels to turn only partway before the turnbuckles fouled on the suspension arms. The steering spindles don't have stops molded into them, and there isn't enough meat on them to install a long setscrew that would prevent the spindles from turning too far.

I finally settled on using TRC* or Associated* body-post rings over

the outer nylon ball cups. The rings act as stops: they hit the upper arm and prevent the turnbuckle from moving past the point at which the rings interfere with spindle movement. It's crude and it looks a little weird, but since installing these linkage rings, I've had fewer sticky situations than before. Every HPI owner who has seen this solution has subsequently tried and endorsed it.

These body-post rings will prevent the linkage on this HPI F1 car from overextending and sticking. This solution looks kind of funky, but it works very well.



PHOTOS BY DOUG MERTES

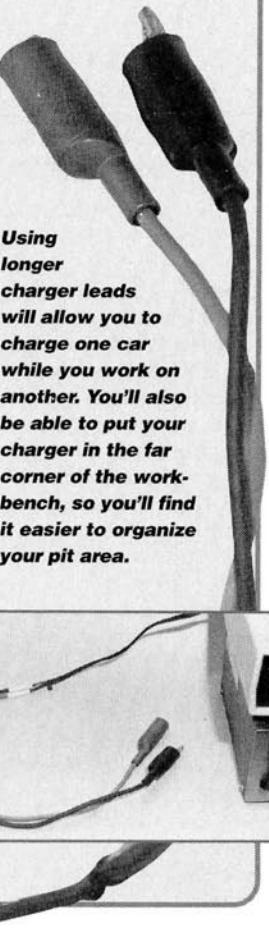
Charger Leads that Make Sense

Do you fight with your charger leads when you're working at your pit table? Most chargers come with fairly short leads installed, and that can lead to lots of problems on your workbench, especially if you run in several car classes and have to charge batteries in one car while you work on another. A couple of years ago, I came across a simple, effective solution: longer charger output leads.

Now, I know that many of you will think: "This isn't brain surgery; this is common sense." All I can say is, walk through the pits at any local or regional race, and you'll see what I saw last weekend: racers trying to work on their cars while the batteries are installed and hooked up to the charger leads and are pulling the charger across the table. I even caught one racer's unit as it was about to fall onto the concrete floor!

On my TURBO-charger, I've used BRP* 14-gauge wire that has been spliced into the original output leads, soldered and insulated with shrink-wrap. Two-foot leads work well for me. That length allows me to set up my charger at the far corner of the workbench, so you'll find it easier to organize your pit area.

area and direct a fan on it, and to keep it out of the way while I work on my cars. You could even make up a couple of lead sets of different lengths to suit a variety of situations; connect them to the charger output leads with high-quality connectors, such as Sermos* or Deans*, that will minimize voltage losses. Don't use leads longer than 4 feet, however, because of the resistance you may encounter while charging. That resistance could conceivably lead to false peaking on some chargers.



Solve the Pinion-Wrench Blues

In my time, I've tried a bunch of pinion-wrench tools ranging from the little L-shaped Allen wrenches that come with most kits to more sophisticated multi-part tools with separate handles and tips.

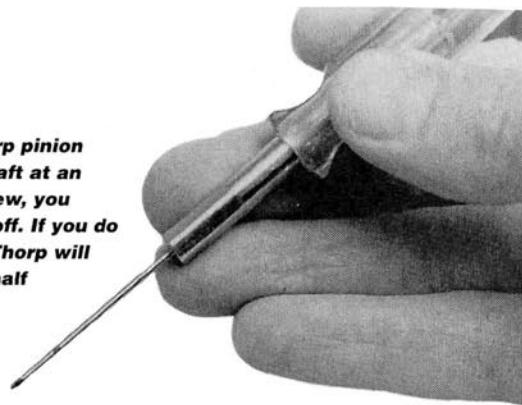
They'll all work for a short while, but the less expensive ones have some real drawbacks: if the hex shaft is made of a soft metal, it becomes rounded off quickly, and to use it, you'll have to cut off a short section with a Dremel tool, a file, or a rotary grinder. Some of the tools with replaceable shafts have fat handles and short hex shafts that can make it difficult to reach into confined places, such as the pinion-

mounting location on a Yokomo YR-4 or a small-scale pan car.

After buying, using and discarding a number of these wrenches, I settled on the excellent Thorp Mfg.* unit. Its handle is slim and fits easily into my pit box; the extended shaft is easily long enough to reach into even the tightest of tight spaces; and the tip is machined of an extremely hard drill-blank material (mine have never become rounded off).

It's the hardness of the tip, however, that gets many racers into trouble. Unless you're careful to approach the pinion setscrew straight on and apply downforce exactly when you tighten or loosen the screw,

If you turn this Thorp pinion wrench with the shaft at an angle to the setscrew, you might snap the tip off. If you do break it, however, Thorp will replace the tip for half the price of a new wrench.



you'll snap the tool's tip right off. And, though it's guaranteed not to round off, it isn't guaranteed not to break.

Over the years, I've probably thrown away three or four of these fairly expensive (\$12 or so) tools, because I thought they were useless when broken. As it turns out, I was really just throwing away money! Thorp Mfg. will replace the tip for \$6—about half the cost of a new tool!

When I recently found this out, I was really embarrassed! With every wrench they sell, Thorp includes a slip of paper explaining how to get your tip replaced: just mail the wrench back to them with six bucks, and they'll put a fresh tip shaft on it and return it (no COD, please). This is a simple case of "the Doctor" not taking his own advice on reading directions and instructions. Learn from my mistake!

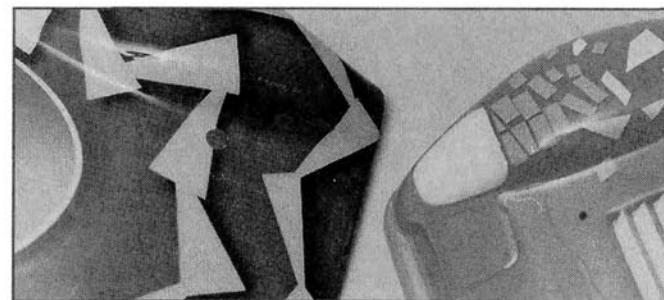
Sweaty Hands on the Drivers' Stand?

OK, I admit it: every time I go up onto the drivers' stand to race, my heart beats a little faster and I get sweaty palms. I guess this just indicates how excited I get about racing, even after years of weekly competitions. But it's difficult to grip your radio when it's all wet and slimy! After trying a number of fixes, from wearing a cotton glove on my left hand to slipping an old white sock over the grip, I stopped at a sporting-goods store and talked to one of the salespeople.

It turns out that tennis players have the same problem. Even if it isn't that hot outside, their activity makes their racquet handles very wet, and that makes it tough to keep the racquet oriented properly. Tennis players use a product called "Grip Wrap" that soaks up the perspiration and stays tacky even when it's damp. I bought a roll of this stuff, and I'm here to tell you that it really works!

The product I use is actually called "grip over-wrap," and it's made by a bunch of manufacturers. I put on a single layer, which was really easy because the wrap is self-sticking. Just follow the directions on the package, and start at the bottom of the radio grip. Wind the wrap around the grip, moving gradually along the handle and pulling off the backing tape as you go.

This stuff is really easy to handle and wrap neatly. When the grip is as you'd like it, just cut the wrap on an angle (use scissors or a hobby knife) so that it will "blend" nicely on the last wrap. Use a piece of the supplied finish tape to prevent the end from unraveling, and that's it! Now you can sweat all you want on the drivers' stand and still keep a firm grip on your radio.



Visibility is Vital

As I get older, my vision continues to deteriorate. Even wearing my latest set of lenses, I find it harder and harder to see exactly where my car is in the corners. On indoor and parking-lot tracks, the boards can tear up your body or suspension components if you hit them at speed; so if you want to be even marginally competitive, you must be able to place your car exactly where it needs to be on the apex, and you can only do that if you can see it.

One solution is to paint your car bodies in bright colors that contrast with the track's surface. Dark colors show up best

Paint "blazes" on your car bodies to make them easier to spot in the corners. You'll be more competitive if you can always see where your car is!

on light concrete or carpet, while white, pink and yellow are good on asphalt or darker shades of Ozite carpeting. It's also a good idea to incorporate a paint scheme that has what I call "blazes" right on the front of the body and at the rear corners, in front of and behind the wheels. These geometric shapes are in colors that contrast wildly with the base coat. Your eye will be able to find and follow these shapes, and that will make it easier for you to lower your lap times and stay off the boards.

So, there you have it—a few prescriptions for what ails you! Just don't call me in the morning!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.



DuraTrax M5



I'M ALWAYS on the lookout for truly trick racing components—especially ones that are made in the USA, reasonably priced and can hold their own with the big dogs. Everything I read about the DuraTrax* M5 forward-only-with-brakes, racing-style electronic speed control (ESC) led me to believe that it would meet these criteria. Boasting killer low "on" resistance and high-frequency motor control, the DuraTrax M5 is listed at just \$64.99. What a deal!

The M5 has enough high-technology printed-circuit boards and surface-mounted components to have come out of a Patriot missile. In its

WHAT IT HAS

- 5 MEGAFETs for forward, 2 for brake.
- Built-in BEC.
- Built-in pulse checker.
- Tamiya-style battery connectors and bullet-style motor connectors.
- Neutral and full-speed control pots.
- High-frequency motor control.
- Reverse-battery-voltage protection.
- Interchangeable input plug system.

Of course, it comes with full instructions, a heat sink, a screwdriver, adjustment-hole plugs and mounting tape.

instruction sheet, DuraTrax specifies a resistance of 0.003ohm—a world-class, killer low resistance. Could it be, I wondered, that a company has come out with a sport ESC that has the guts of a pro model? It was time to check the unit in my "Scoping Out" lab.

The DuraTrax M5 will easily survive the heat and excitement of racing, and it will handle a hot, modified motor.

TEST 1—RESISTANCE

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

To avoid destroying this controller because of

ignorance, I read the instruction sheet thoroughly. It includes an excellent drawing that shows how to connect the DuraTrax M5 with the motor, battery and receiver and how to install the right receiver plug. There's also a list of the proper setups for all the popular transmitters.

- Voltage drop along the full length of the battery wires and motor wires: 0.22 volt—a resistance of 0.0183ohm.

- Voltage drop 2 inches along the battery wires and motor wires: 0.07 volt—a resistance of 0.0058ohm.

These readings raise a few interesting points.

The first resistance reading (battery connectors to motor connectors) is close to three times higher than the second one, showing that long wires and Tamiya-style connectors will kill an ESC's performance.

The second reading shows that the DuraTrax M5's performance is comparable to those of several racing controllers that cost much more.

DuraTrax claims a resistance of 0.003ohm, but my reading was 0.0058ohm. This is because DuraTrax gives the resistance only for the FETs (current-handling transistors), and my reading includes the printed-circuit board, the wire and the solder joints.

TEST 2—OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20

amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps. I install the heat sink, but I do not provide any cooling air.

I jacked the current up to 21 amps and sat back for 15 minutes, after which the M5 was warm, but the battery connector was hot! Score 1 for the speed control and a big fat zero for the connectors.

TEST 3—SHORTING OUT

In my dead-short test, I check to see whether the ESC could survive the heavy current it would have to withstand if a gear jammed or the motor fried. I try to force the controller into thermal shutdown by putting a piece of monster wire rigged with two alligator clips across the motor leads.

The current jumped to 40 amps, and after 1 minute, the M5 was hot, but not damaged; in fact, it never missed a beat. The DuraTrax M5 will easily survive the heat and excitement of racing, and it will handle a hot, modified motor.

COUNTRY ROAD...

I installed the M5 in my MRC MT-10S truck. This went smoothly, and even beginners should find it easy. The M5 can handle 7-cell packs and modified motors, and it's small and light enough to fit in any $\frac{1}{10}$ - or $\frac{1}{12}$ -scale vehicle.

The battery and motor connectors and the somewhat thin battery and motor wires are the only problems with this controller. You could replace the connectors with high-performance ones such as Litespeed* Power Pole connectors, but this



will void the 120-day warranty, so it might be wise to wait.

I'm living out in the

country now, so I have plenty of room to roll. I ran the MRC MT-10S down the road to check

for glitching. Right away, the DuraTrax M5 showed itself to be a first-class controller. I'm always amazed at how smoothly these new-generation high-frequency ESCs work—especially at the mid to low throttle settings. Even when I could barely see the truck, I turned it around and drove it back—all glitch-free. The BEC circuit is obviously well filtered and keeps motor noise out of the receiver.

Next, I drove up the bank and across my yard. The MRC MT-10S jumped, bounced and pushed its way along—fun driving, but brutal on the motor, battery and ESC. After 5 minutes of this treatment, the motor

and battery pack were very warm, but the DuraTrax M5 ESC's heat sink was barely above ambient temperature—testament to its world-class low resistance.

The DuraTrax M5 is smooth, fast and cool-running—an absolute dream. Run times are good, and the brakes are strong. This controller has the price tag of a sport model and the heart of a pro model, so if you're into racing and need an ESC that can run with the best, but you lack the funds to buy a pro racing model, check out the DuraTrax M5.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■

SPECIFICATIONS

DIMENSIONS

Height	.08 in.
Width	1.4 in.
Length	1.43 in.
Weight with wires	2.0 oz.

TUNING

Access to controls	Excellent
Ease of adjustment	Very good

LIST PRICE/ WARRANTY

\$64.99/120 days

MANUFACTURER'S SPECS

Max. voltage	10 cells
Min. voltage	4 cells
Max. current	Unlisted
Continuous current	250 amps
Resistance	0.003 ohm

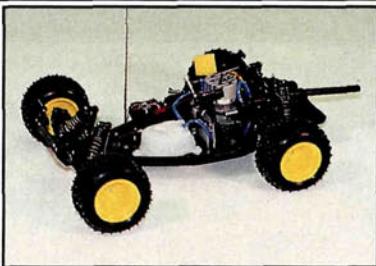
TEST PARAMETERS

Voltage	6 volts
Current	12 amps
• Voltage drop	
—along full length of wires	0.22 volt
—2 inches along wires	0.07 volt
• Resistance*	
—along full length of wires	0.0183 ohm
—2 inches along wires	0.0058 ohm
BEC output, 6-cell battery	5.67 volts

*Resistance = Voltage drop + Current

COMMENTS: this is a sport ESC with the innards of a pro model; it has enough current-handling capacity to cope with 7-cell packs and modified motors; what's more, it's small, light and reasonably priced.

NEW NITRO STORM 21-XS TRUCK



The Nitro Storm 21-XS comes complete with a 21 P/S engine, ABC piston/liner, ball bearing crankshaft, slide carb. New strong steel chassis, full ball bearing set and fully ballraced transmission and clear molded body.

U400 NITRO 10 "STORM 21-XS" TRUCK

SALE PRICE \$265.50



The CAT E.C.S. is an economical sport version of the CAT E.C. with the same laydown suspension and shorter parallel pin wishbones. Option parts enable you to fully upgrade to the Euro Championship edition.

U401 NEW CAT 2000 E.C.S. "SPORT" 4WD

SALE PRICE \$221.70

NEW club10-2



All new gear transmission and heavy diff. The new transmission is easy to assemble and has no adjustments to worry about while the differential uses the same components as the Nitro 10 range for greatly improved reliability. New moulded black vari-shocks with dampening snap on suspension and steering links which require no adjustments.

CLUB 10-2 - ON ROAD TOURING 2WD

Choice of 5 body styles: Alfa, Opel Calibra, Escort Cosworth, Mercedes & Mondeo.

SALE PRICE \$107.70



1/10th Scale 4WD includes motor and mechanical speed controller independent wishbone suspension, black WFE chassis, coil springs over oil filled shocks, twin UJ driveshafts, steel bushings.

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SPECIFICATIONS

Scale 1/10
List price \$169.99

DIMENSIONS

Overall length 17 in.
Wheelbase 11 in.
Front width 11.25 in.
Rear width 11.5 in.

WEIGHT (gross, RTR) 4 lb., 14 oz.

CHASSIS

Type Molded tub
Material Kelron

DRIVE TRAIN

Type Gear reduction
Primary Pinion/spur
Transmission Dogbone/axle
Differential(s) Gear
Slipper clutch No
Bearings/bushings Plastic/metal bushings

SUSPENSION

F/R: Type Lower A-arm with upper
camber link
Damping Oil-filled coil-over shock

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 2.4 x 1.7 in.

TIRES (F/R) Semi-pneumatic V-tread

ELECTRICS .. Motor and rotary mechanical
speed control included

Kyosho HiRider II

by George M. Gonzalez

WITH THEIR new HiRider II, Kyosho* has somehow managed to kill two birds with one stone. This truck will appeal to R/C'ers who are looking for a sleek, dazzlingly stylish street rod, but would like to crush an occasional car or two while cruising the boulevard. What's that traffic? No problemo; I'll take the high road!

KIT FEATURES

The HiRider II is based on Kyosho's highly successful Tracker 2WD monster truck, and it has the same chassis, suspension and drive-train components. The truck's foundation is a tough, light, nylon-composite tub chassis that has tons of room for R/C electronics. The chassis is strengthened with a nylon top plate that doubles as a steering-bellcrank brace. For smooth operation, the steering bellcrank pivots on an aluminum post, and a servo-saver protects the servo from occasional curbside collisions. The chassis also features a nylon radio tray/battery support that acts like a backbone to further strengthen the chassis.

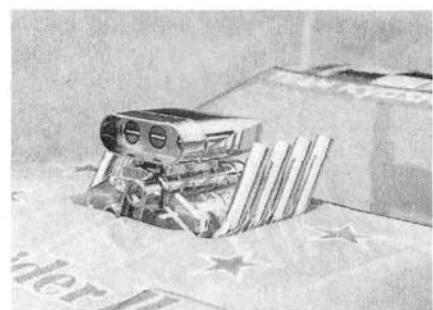
The truck features a fully independent suspension with nylon composite suspension arms and molded, non-adjustable upper links. I think it's great that Kyosho includes the non-adjustable links because it gives beginners one less thing to worry about. Besides, you could always replace them with turnbuckles later. Large-

capacity, good-quality, oil-filled bouncers grace all four corners; they feature double O-rings for leak-free operation and include rubber diaphragms to prevent those pesky air bubbles from forming.

The truck's tranny is a little on the rustic side, but it works quite effectively. The tranny has two internal gears: a gear diff (with aluminum internal gears and a molded diff housing) and a final gear. The tranny also has two external gears: a counter gear and a center gear. The center gear mates with the motor's 20-tooth pinion gear, which makes the whole thing spin. The provided metal bushings are better than plastic, but I found the tranny a little on the sticky side. I'm sure that the tranny will smooth out when it has been broken in.

TEST GEAR

The kit comes with a high-quality, 3-speed rotary speed control that has reverse. I've never been fond of mechanical speed controls, but I think it's great that Kyosho includes one, because it makes it easier for beginners to get started.



The chrome engine looks really cool sticking up through the opening in the hood. With a little ingenuity, the engine could be detailed with spark-plug wires and a distributor cap. The exhaust pipes and blower pulley could also be painted for that really trick look.

Kyosho also included a powerful Mabuchi 550 motor, so all you'll need to supply is the radio gear. To command this beast, I enlisted the help of my trusty Airtronics* Rival 2P with its AM receiver and two 94102 standard servos.

PERFORMANCE

The HiRider II was put through its paces at my favorite torture arena—a BMX track. Part of the track was undergoing reconstruction, so there were plenty of dirt mounds and lots of loose stuff for some serious hammering.

Using a Trinity* Street Spec battery pack, the HiRider's 550 motor provided decent—although by no means neck-snapping—acceleration. I found Kyosho's rotary speed control surprisingly smooth for a mechanical unit. Takeoffs were easily controllable, and finding reverse was simple.

I was very impressed with the HiRider II's stability at full speed. It showed virtually no sign of tipping over, even when I



Factory Options

- Ball bearings—part nos 1901, 1903, 1911.
- Special tie-rod set—W5005.
- Universal swing-shaft set—5061.
- Ultimate shocks (aluminum)—W5099.

Things You'll Need

- Battery.
- Radio gear.
- Paint for body.

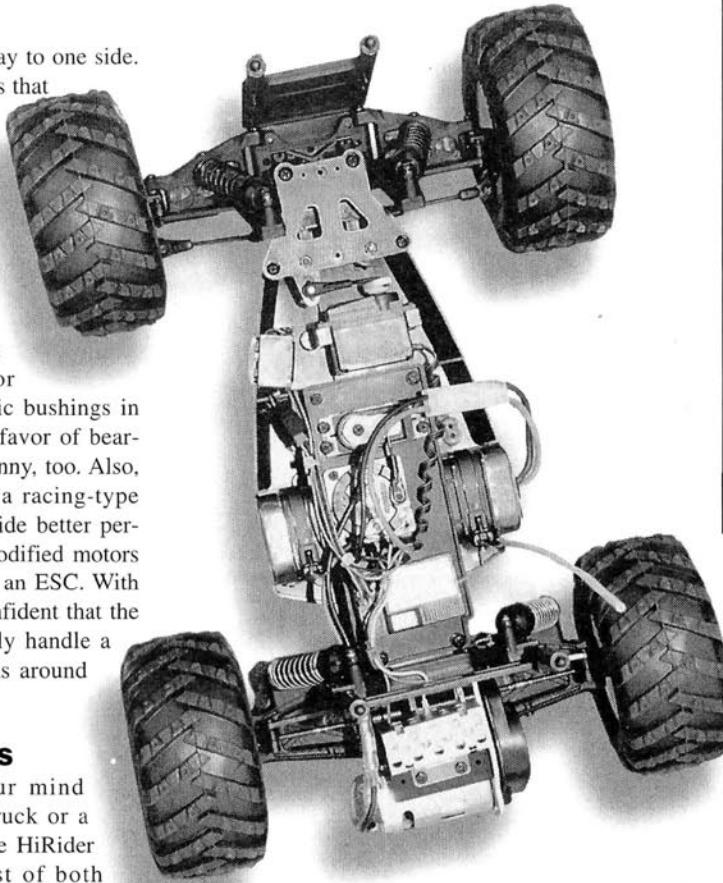
KYOSHO HIRIDER II

cranked the steering all the way to one side. The only thing I recommend is that you enlarge the body's front-wheel openings. When trimmed along the scribed cutout lines, the body severely rubs on the front tires when cornering; it's almost like having special "cornering brakes."

Right out of the box, the HiRider II is no slouch. For long-term use, toss the plastic bushings in the front and rear wheels in favor of bearings, and get some for the tranny, too. Also, replace the 550 motor with a racing-type stock motor, which will provide better performance. Stay away from modified motors until you can afford to install an ESC. With bearings and an ESC, I'm confident that the HiRider II's tranny will easily handle a mild mod motor (one that has around 17 turns).

FINAL THOUGHTS

If you can't make up your mind whether to buy a monster truck or a mean street machine, kick the HiRider II's tires; it offers the best of both worlds. For an entry-level vehicle, you'll be impressed with the quality of the HiRider II's parts and its excellent instructions and ease of assembly. You'll also like the chassis' oil-filled shocks and the inclusion of several handling adjustments.



As you can see, everything fits nicely. The kit includes twist ties for the speed-control wires. If you decide to equip this beast with an ESC, you have plenty of mounting choices—a rarity among R/C cars.

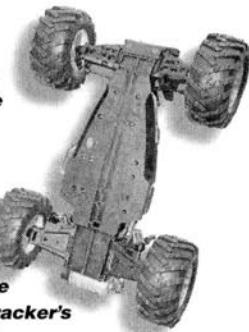
Likes

- Awesome looks.
- Lots of chrome accents.
- High-quality materials.
- Many upgrades available.
- Excellent instruction manual.

Dislikes

- Tranny is a little outdated, and some binding was evident.
- No ball diff or slipper clutch.
- Plastic bushings on the front wheels and rear axle carriers had a lot of flashing that had to be removed.

This flip-side view shows the HiRider's rugged, molded chassis, which is identical to the Kyosho Tracker's chassis. I was concerned that all the little nooks and crannies would collect dirt and mud, but these areas managed to remain free of debris during the thrash test.



Building and Setup Tips

I found the HiRider II extremely easy to put together, and I encountered only a couple of snags during the assembly process.

First, the plastic bushings, which go on the front wheels and rear axle carriers, were a little tight, and that caused excessive friction. Be sure to remove any flashing that's left after the molding process (three out of the eight bushings on my kit had a considerable amount of flashing).

Next, use plenty of grease on the bushings when you break them in. After the first run, remove the bushings, and clean them with a rag (I used a little motor spray that was safe for plastic parts). After you've cleaned them, add more grease, and they should operate smoothly.

I noticed that the metal bushings in the tranny were also tight and were causing excess friction. Be sure to add a liberal amount of grease to these bushings before you install them. After a couple of runs, they should start to loosen up and allow the tranny to spin freely. This will

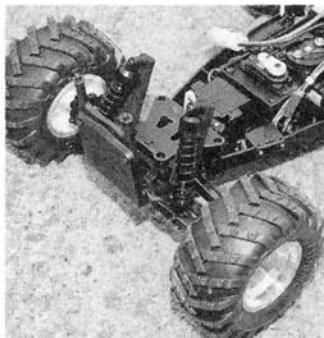
yield longer run times and quicker speeds.

All the shocks, shock pistons and plastic O-rings are mounted on a parts tree and will have to be trimmed properly to ensure smooth damping operation. Use a sharp hobby knife to remove all the burrs, then file off the remaining blemishes with a nail file. *This is critical!*

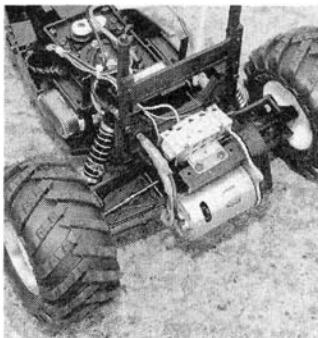
Painting, detailing and assembling the body set is easy. However, my kit's body lacked any sort of "dimple" marker to show where I should drill the holes to mount the faux V8 engine. I used a ruler to measure the space between the engine's holes, then I transferred this measurement to the body.

Also, the instructions didn't show where all the included decals should go. Look to the kit's box art for placement of the remaining decals.

Other than these small complaints, the kit went together easily, and I found the instruction manual easy to follow. As always, I recommend that you read the instructions thoroughly before you attempt to build the kit, and be sure to follow each step to a "T."



The HiRider's independent front suspension features tough, molded suspension arms, non-adjustable upper links and big oil-filled bouncers that can flatten out any terrain. Check out the beefy front bumper/body mount.



Out back, you'll find rugged suspension arms with molded upper links, oil-filled shocks and a beefy rear body mount. Check out the aluminum motor mount, heavy-duty speed controller resistor and the Mabuchi 550 motor—all standard equipment.



The HiRider's tires are big and bad; the aluminum-finish wheels are cool-looking. Nice touch, Kyosho.

The Competition

	Kyosho HiRider II	MRC MT-10M	Tamiya Super Blackfoot	Traxxas Stampede
Wheelbase	11 in.	13 in.	10 in.	10.875 in.
Width (F/R)	11.25 in./12.5 in.	13 in./12.875 in.	12 in./12 in.	12.5 in.
Weight	4 lb., 14 oz.	4 lb., 2 oz.	5 lb.	4 lb., 12 oz.
Diff type	Gear	Ball	Bevel gear	Planetary gear
Chassis	Kelron	Fiber-reinforced nylon	Molded ABS plastic	Composite nylon
List price	\$169.99	\$n/a	\$179.95	\$170
Available at*	\$129.99	\$110	\$119.96	\$100
Reviewed in	3/96	1/95	4/93	3/95

*Prices vary with location.

Despite not having a slipper clutch, the HiRider II's tires provide good traction; just stay away from hard-packed dirt—unless you like doing donuts.

The HiRider II is inexpensive and fun to drive, and having fun is why most people get involved in this wonderful hobby. So what are you waiting for? Pick up a HiRider II and live large!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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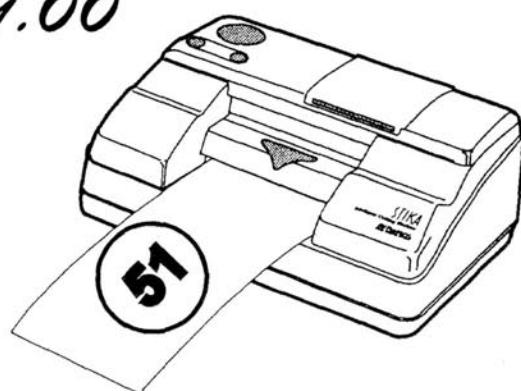
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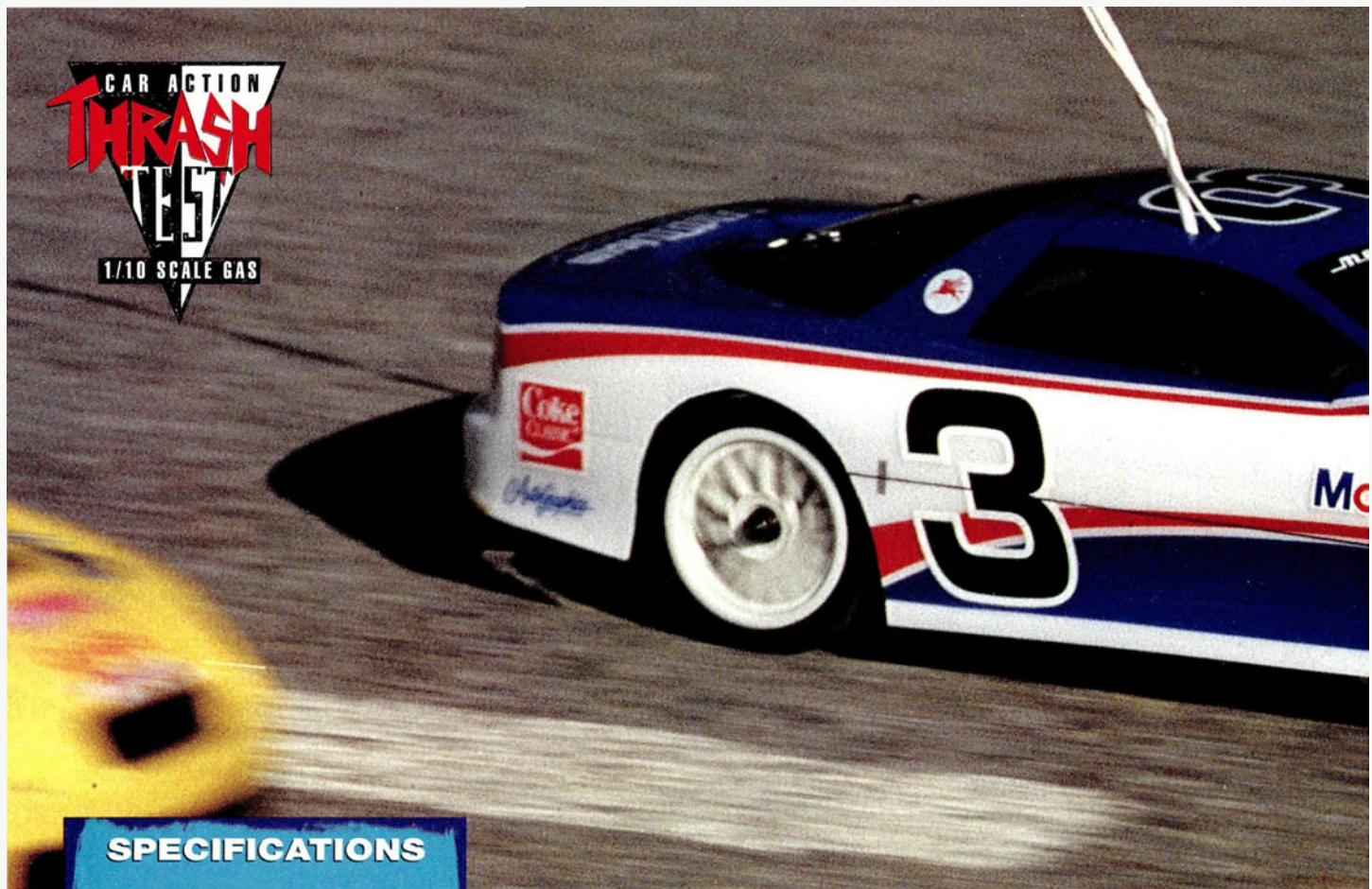
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SPECIFICATIONS

SCALE 1/10
LIST PRICE \$349.99

DIMENSIONS

Length 15 in.
Width 7.75 in.
Wheel base 10.25 in.
Weight 3.2 lb.

CHASSIS

Type Pan
Material Aluminum

DRIVE TRAIN

Type Gear/belt
Differentials (F/R) Bevel gear
Transmission Dogbone/axle
Brakes Disk
Bearings/bushings Bushings

SUSPENSION (F/R) 4W,
Independent double-wishbone
w/plastic coil-over dampers

WHEELS/TIRES (F/R) 1-piece
plastic spoke pneumatic rubber,
on-road slick, foam inserts

POWERPLANT GS-11X w/pull-starter
Pipe Resonant chamber
Carburetor Rotating barrel

Kyosho **GP-10**

by RICK SCHWARTZ

I'VE BEEN racing electric R/C cars for almost eight years. I never made the conversion to gas because I thought the gas cars were too temperamental, too messy, too complicated and too noisy. Well, my "masters" at the magazine decided I was being a little provincial and should take my head out of the sand. They said that I should learn from experience and that they'd be sending me a gas car to review! I begged them for a basic kit—one that would be easy to build and would crank over easily, but has lots of potential on the track. Fortunately, they did!

The Kyosho* GP-10 is an entry-level 4WD on-road racer that meets all my criteria. And after all these years, I'll also admit that I was wrong. Gas is a blast, and the GP-10 made my first venture into the realm of nitromethane a winning experience.

KIT FEATURES

The GP-10 was designed to give first-time gas racers the opportunity to build an R/C

gasser following instructions that won't intimidate you as soon as you look at them. The instructions are thorough, but have to be followed carefully. The car's backbone is a heavy-duty aluminum chassis that's fairly light, but strong enough to take abuse.

Most of the other parts are plastic, but it's of the heavy-duty variety that will bend but won't break. Because it's 4WD, the car has two diffs. The diff housing is plastic, but the bevel gears are aluminum. Everything fits perfectly; there are no bearings, but the metal bushings work smoothly. The car uses pulleys and three belts to put the power to the ground. There isn't a belt tensioner, but Kyosho offers an aftermarket version.

The shock towers and suspension parts are sturdy and provide 4-wheel independent suspension, but this is where I had my only real disappointment with the kit. The shocks are oil-less coil-over plastic dampers, and no provision is made for sus-



Gas Powered

Ponycar

FACTORY OPTIONS

Kyosho makes more than 50 hop-up parts that can improve the GP-10's performance. For a complete list, check with Great Planes*.

The more popular add-ons include:

- Ball-bearing kit.
- Center belt tensioner.
- Aluminum center-diff mount set.
- Center one-way unit.
- Locking jig and four-way wrench.
- Two-speed racing tranny.
- Anodized chassis.

Building and Setup Tips

In their construction and setup, I find gas cars a little more finicky and complex than their electric counterparts, mainly because of the additional throttle and brake linkage and the need for engine break-in. My only real problem with the Kyosho GP-10 was that almost all of the nuts, screws and bolts came in the same bag. While constructing it, you have to keep sorting through the pile to find the right ones, and a 3x8 self-tapping screw is pretty close to a 2.6x8 self-tapping screw. So, although it may be time-consuming, I suggest that you separate the various screws, etc., into different containers to ensure that you pull out the right one when needed. Also don't pull any parts off the plastic parts trees until you need them. Parts for particular assemblies look alike and are not all on the same tree. Use the picture part guide.

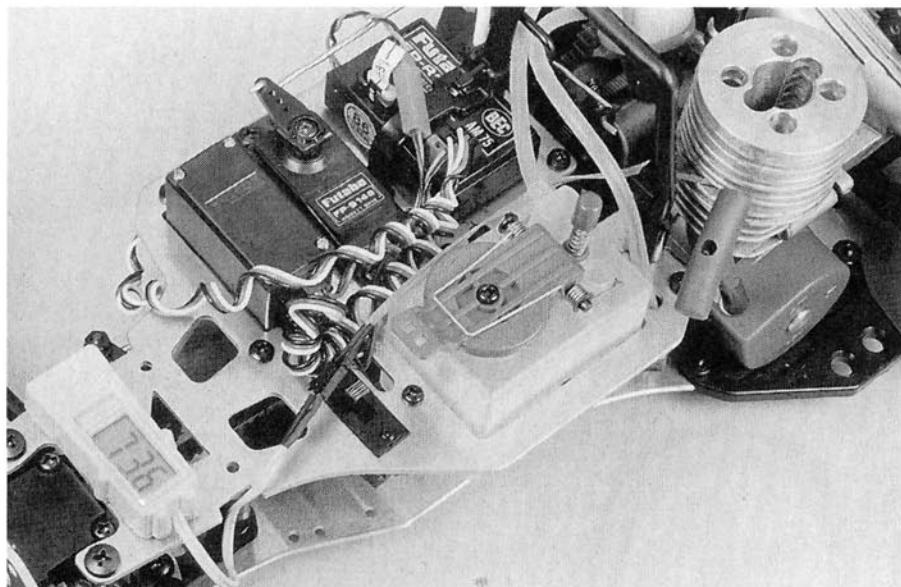
Where metal bushings are called for, they must be pressed in all the way. It's a tight fit, but by pushing down on a flat surface, you'll be able to install them without too much trouble.

Always—and I mean *always*—use threadlock when it's called for because a gas car vibrates a lot more than a electric car.

Tips for Specific Sections

- When installing the brake pads, the picture tells you to allow $\frac{3}{16}$ -inch spacing, but unfortunately, the drawing is not to scale. For a proper measurement, use the inch/millimeter ruler on page 20.
- Step 11: installing the belt drive. Before you screw the gear plate to the chassis, install the shaft pin on both ends of the shaft.
- Step 21: installing the front upper arms. Before installing the dogbones, be sure to remember the O-rings.
- The radio tray is a little crowded, so follow the instructions carefully. The final and most difficult part of the job involves setting the throttle and brake linkages. Although the directions are fairly clear you probably will have to set them several times before you get it right. Don't get frustrated.
- When you break-in the motor, again follow the directions to ensure that everything seats properly.
- If you find that the starter cord is hard to pull, the engine is probably flooded. Loosen the glow plug and drain the unburned fuel out of the combustion chamber. Tighten the glow plug, prime the fuel tank and try again.

KYOSHO GP-10



A 75cc flip-top fuel tank holds enough fuel for a decent run time. The radio gear is by Futaba. Hot tip: put a little "cushion" between your receiver and the radio tray so that it doesn't vibrate excessively and suffer from radio interference.

pension adjustment. But remember that this is an entry-level kit, and Kyosho offers optional upgrades for when your skills and wallet allow you to grab 'em.

Basically, the car has three sections—an aluminum radio tray, the motor and the power train. It's pretty nifty. The radio tray is one of the kit's neatest features; it contains the servos, fuel tank, receiver, receiver battery and on/off switch. It's ingenious how everything fits together and can be unbolted fairly easily if you need to change the servos or work on the chassis or motor.

The heart of the beast is the Kyosho GS-11X engine with a pull-starter.

The final touches include plastic wheels, racing slicks with foam inserts and in my kit, a Protoform Camaro body. (Also avail-

able are Sard Supra, Opel Calibra, Skyline GT-R and Porsche 911 GT-2 body sets.) I didn't have to worry about painting the body because Richard Muise of Motion Graphics* sprayed it to look like an SCCA racer. When the body reached me, it looked really hot.

TEST GEAR

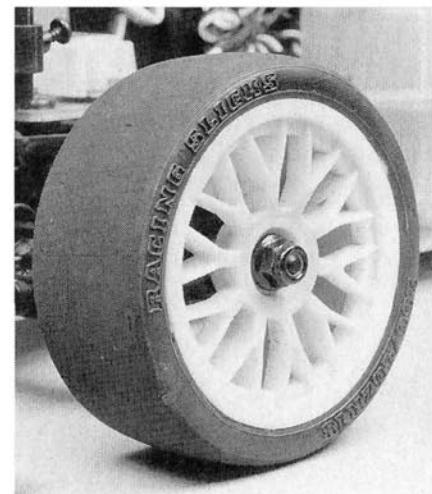
For this entry-level racer, I decided to go with radio equipment that would not cost an arm and a leg, but would still offer the performance I needed. I chose a Futaba* Magnum Jr., which comes with two SP-148 servos, an FP-R112JE receiver and a receiver battery pack. The glow-plug igniter was a Super Hot Shot from Hobbico*, and I chose Morgan Fuels' gas. Everything

likes

- Engine cranked right up.
- Parts fit together perfectly.
- Perfect entry-level gas car.
- Numerous upgrade options are available.

dislikes

- Drive-belt tension can't be adjusted.
- No oil-filled shocks.
- Screws and miscellaneous hardware aren't packaged according to assembly steps.

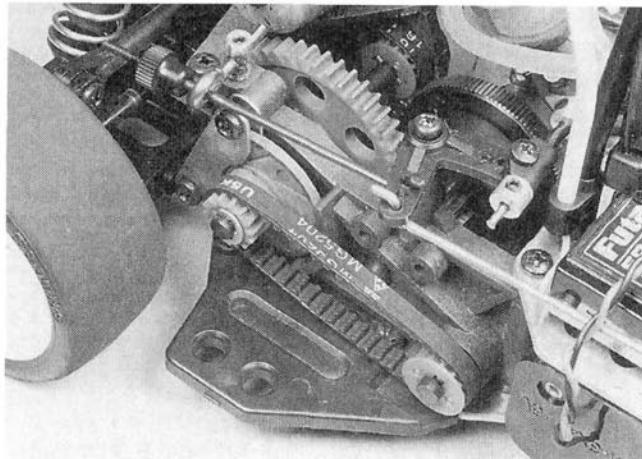
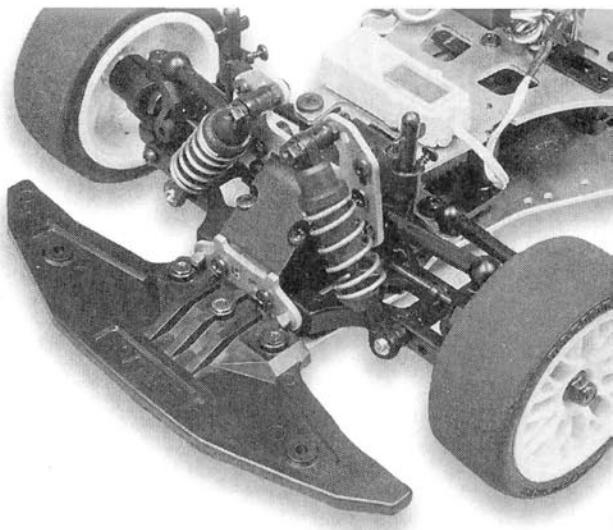


Kyosho's Racing Slicks come with the car and provide plenty of grip.

Things You'll Need

- 2-channel radio with two servos.
- Ni-Cd battery pack for the receiver.
- Glow-plug igniter (additional glow plugs are recommended).
- 10- to 15-percent-nitro fuel.
- Fuel bottle (it makes life a lot easier!).

Coil-over shocks provide the front and rear damping. Later, you might want to upgrade to oil-filled units, not only for a better ride, but also because they are more "tunable."



Power reaches the ground through a belt-drive system. The plastic disk brake is incorporated in the system.

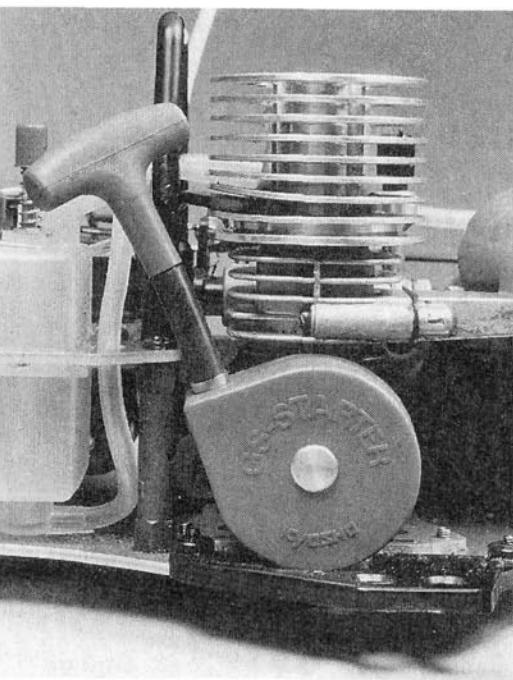
else comes with the car, so I really didn't have too many decisions to make.

I also use the MIP* On-Board Temperature Gauge, because it allows you to monitor engine temperature at a glance.

must to ensure a long engine life. After completing the necessary break-in and "leaning" the engine out for optimum performance, I was ready to hit the track. To be on the safe side, I took a couple of gas racers with me, but I soon discovered that the GP-10 is user-friendly.

Getting the engine started was really simple: plug in the igniter, pump the fuel primer, tug the pull-starter a couple of times and the engine jumps to life—never balky and always ready to run. So another of my misconceptions about gas cars went down the drain. When you hear the whine of the engine and smell the burning gas, you're hooked.

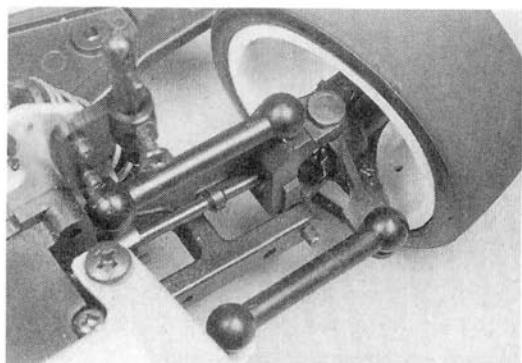
The engine's power band was wide, and it jumped from a dead start to top speed fairly quickly. Constantly checking the MIP Temp Gauge, I found the engine running well within the recommended temperature limits—at about 190 degrees. The disk brake worked extremely well and provided the control needed



The Kyosho GS-11X's performance is "peppy." It doesn't have the power of an O.S. CZ-R or CZ-Z, but it does have plenty of get up and go. It's missing only a low-end needle adjustment.

for a 4WD racer. The servos were more than adequate to control the throttle, braking and steering.

Handling could use improvement. Because there's no way to damp the car's suspension, on acceleration, the rear end had a tendency to drop and make the car



Having non-adjustable links makes it easy to set up the car initially, but it's impossible to tune later. The hot setup would be to replace them with turn-buckles of some kind (as your skills and your wallet allow).

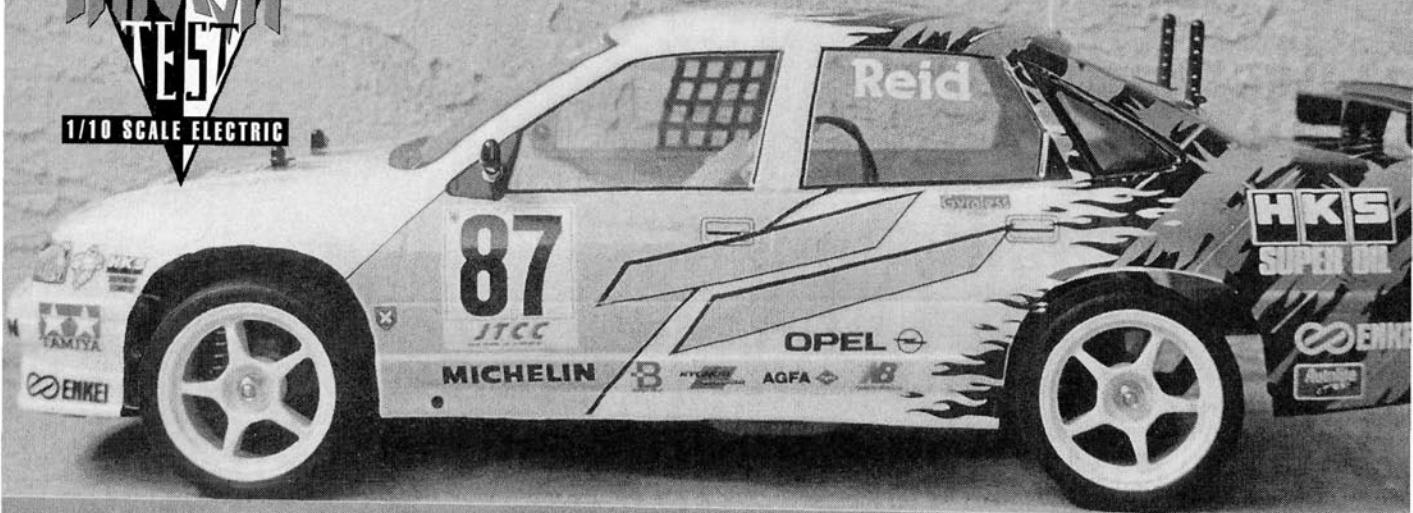
bounce. Going into the turns, the front end also dove, making the car lose traction and fishtail. There's a simple remedy for this: replace the dampers with "true" oil-filled shocks and buy the front-end-linkage adjustment kit.

FINAL THOUGHTS

This car has great potential, and it's a great car for beginners. It's easy to build and a blast to drive and—most important—it's dependable. You can familiarize yourself with the basics of gas and then move into a competitive mode. I'm a convert! You can drive and drive and drive some more. All you need are bottle of fuel and a lot of time on your hands.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

CAR ACTION
THRASH TEST
1/10 SCALE ELECTRIC



HUNTER KILLER *Sedan*

Specifications

SCALE 1/10
LIST PRICE \$260

DIMENSIONS

Length (overall) 17.125 in.
Wheelbase 10.19 in.
Width (F) 7.125 in.
Width (R) 7.19 in.

WEIGHT

Gross (with batteries) 3 lb., 10 oz.

CHASSIS

Type TAO2 tub
Material Plastic

DRIVE TRAIN

Type Gear
Primary Pinion/spur
Transmission Dogbones/axles
Differential(s) Ball diff
Slipper clutch None
Bearings/bushings Plastic and metal bushings

SUSPENSION

Front and rear Independent arms
Damping Coil-over, oil-filled plastic shocks

WHEELS

Type (F/R) One-piece plastic
Dimensions (DxW) 2x1 in.

Factory Options

- OP 137-53137: FWD touring car ball-bearing set
- SP no. 355-357, 477: pinion gears from 20T-25T
- 53025: silicone shock oil (soft set)
- 53026: silicone shock oil (medium set)
- 53027: silicone shock oil (hard set)
- 53044: Dynatech 02H motor
- 53124: 3mm tungsten-carbide diff-ball set
- 53140: touring and rally car aluminium spoke wheels (1 pair)
- 53172: 4WD-TAO2 and FWD car universal shaft set (1 pair)
- 53177: FWD aluminum motor heat sink
- 53191: 4WD/FWD touring and rally car turnbuckle tie-rod set
- 53214: super-grip radial tires (1 pair)

Tamiya HKS Opel Vectra

by WENDY MATSUDA

IN THE PAST few years, parking-lot racing has become a popular R/C pastime. It's spreading throughout the nation, and it's thriving well in areas where there are no nearby R/C racetracks. Part of the reason for its widespread popularity is that it's relatively inexpensive to get started. Another reason is convenience. You won't have to drive too far to find an adequate parking lot. I think the main reason why parking-lot racing has become so popular is because the cars that run in these races look so real. It's as if you're watching a real Indy 500, NASCAR, or NASTRUCK race—only it's in $\frac{1}{10}$ scale.

Even before the parking-lot racing craze or cost-control racing, Tamiya* was already well-known for their scale R/C cars. Their scale touring cars, such as the 4WD Castrol Celica and the FWD Ford Mondeo, have been parking-lot hits. If you're into parking-lot racing, or you're thinking about joining in on the fun, you'll be happy to know that Tamiya has added a new touring sedan to their lineup.

KIT FEATURES

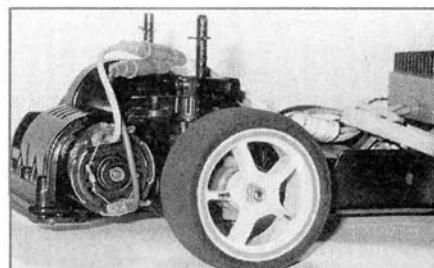
The HKS Opel Vectra JTCC is Tamiya's newest $\frac{1}{10}$ -scale FWD touring sedan. Like Tamiya's other sedan kits, it's equipped with a plastic tub chassis; oil-filled, coil-over shocks (these are also made of plastic); a stock 540-size motor, a four-head nut wrench; a three-step mechanical speed control with reverse; lots of decals; and a gorgeously detailed body that even includes the side mirrors.

As usual, Tamiya does an excellent job of

organizing the kit. You won't have to open more than two bags at a time. The assembly manual is so simple that you could put the car together just by looking at the illustrations (it's still better if you read all the instructions).

Building the Vectra and painting the body was easy, but detailing the body was a different story. There are more than 100 decals, and I highly recommend that you use Autographics* "Sticker-On Decal Application Fluid." Mike Ogle mentioned this product in his *Car Action* article "How to Paint and Detail Sedan Bodies" (August '95 issue). Like the Opel Calibra, the Vectra has the distinctive yellow grille, a large yellow stripe and two yellow slashes across the doors, but that's where the likeness ends. From the rear wheels to the back bumper, the Vectra turns into an aggressive hot rod, sporting black flame decals, a pattern of green and purple splotches and red laser beams. Even my Mom, who's usually apathetic about R/C cars, liked the Vectra.

Underneath this rather snazzy body lies Tamiya's unique FWD chassis. I've never seen or built a FWD car before, and it's nothing like an off-road car. No slipper, tumbuckles, or camber adjustments. The chassis is so simple that I almost had to stop and ask myself "Is that it?" The setup is very different from a rear-drive car. For starters, the motor and the gearbox are in the front; this concerned me because the bumper seems too small to offer reasonable protection. The front wheels are equipped with dogbone-type drive



The stock 540 motor provides ample power to move the HKS Opel along at a brisk pace. For those who feel the need for more speed, a hot ROAR or NORRCA stock motor will help you move along a little faster.

shafts, and the bellcrank steering system is simple and effective.

Like other FWD Tamiya sedans, the Vectra's tranny is equipped with a smooth ball diff and large gears that look so sturdy and durable that I don't think any novice could ever shred them. The three-step mechanical speed control with reverse is somewhat bulky, but when it's installed, its weight helps rear

Things You'll Need

- Basic hand tools
- 2-channel radio with two servos
- Paint
- Battery packs
- Battery charger

likes

- Performs well and remains stable at high speeds.
- Great stopping ability.
- Awesome scale resemblance to the real thing.
- Cool Enkei mags and sticky slicks.
- Tamiya sedan bodies are interchangeable.

dislikes

- What? No driver/interior kit?
- Plastic bushings.
- Plastic shocks.

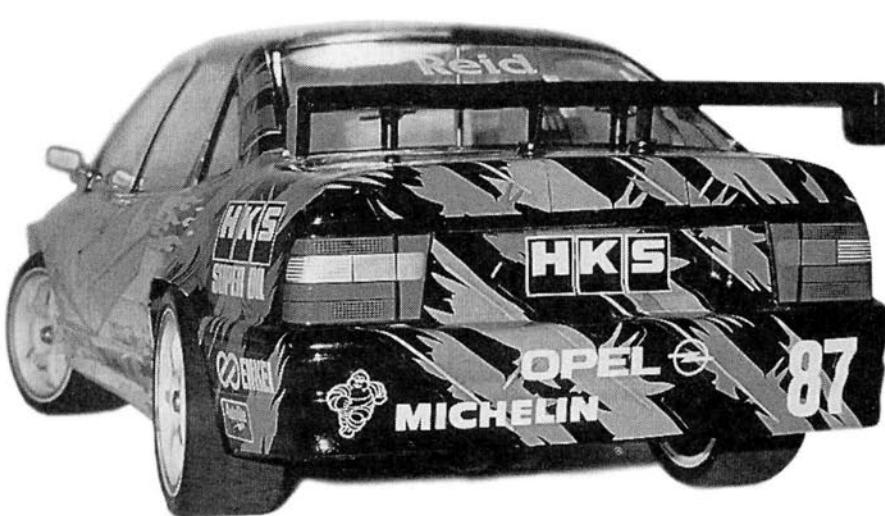


PHOTO BY WENDY MATSUDA

Building and Setup Tips

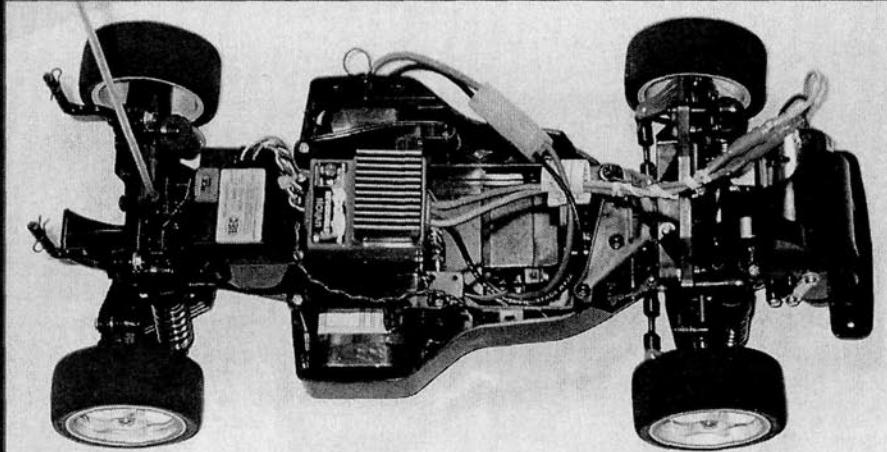
Building most Tamiya kits is easy, but make sure to read all the instructions, and pay attention to detail. Here are a few tips that should help you with the Vectra's instructions.

• Step 10—assembling the shocks. Despite what the illustration shows, never hold a bare shock shaft with a needle-nose pliers when you twist on the shock ends. You might scratch the shaft and cause the shock to leak. Put fuel tubing over the shaft to protect it from the pliers' teeth.

• Steps 21 and 22 (supplement)—the mechanical speed control.

This part is a little confusing because the instructions aren't included in the assembly manual. Instead, supplementary instructions are enclosed in the bag that contains the mechanical speed control; you'll have to dance between the two and alter the order of the steps.

If you plan to install the stock mechanical speed control, do it in the middle of step 21. First, install the steering servo, then skip to step 27, and attach the rear section to the chassis. Open up the mechanical speed-control bag, and follow the supplementary instructions for step 21. Attach a servo to the side of the battery brace (part E-1), and attach the speed-control mount to the top of part E-1. Since the speed control and resistor are 95-percent assembled, attach the wires from the speed control to the resistor. Then continue with step 22 of the supplement, and install the battery brace, receiver, resistor and speed-control cover. Finally, go back to the assembly manual, and continue with step 23.



I replaced the stock three-step mechanical speed control with a Novak Rooster reversible ESC.

OPEL VECTRA

traction. The speed control is adequate for beginners, but sooner or later you'll want to upgrade to an ESC.

You may also want to upgrade the stock plastic bushings. Tamiya offers a ball-bearing kit that will improve the Vectra's performance. Plastic bushings tend to wear quicker than metal bushings and bearings. After more than 30 runs, the plastic bushings are still in good shape, but I still think metal bushings or ball bearings would be better.

The plastic oil-filled shocks work quite well, and I haven't had any problems with leaks. The shock springs are stiff just like the suspension of a full-size sports car. And just like its full-scale counterpart, the chassis is low to the ground. You should have about 1 centimeter of ground clearance at most.

TEST GEAR

I used the Python—JR's* pistol-grip radio, and I was really impressed with its features, performance and ergonomics. The Python comes with the NER-102 AM receiver and two standard NES-510 servos. The receiver may look big, but it doesn't weigh much more than other receivers. The Python also has servo-reversing, steering and throttle trims and variable-rate steering.

To harness the motor's power, I used the stock Tamiya three-step mechanical speed control for a while, but like all three-step types, acceleration was somewhat spastic. To give the Vectra more realistic movement and better performance, I replaced the mechanical speed control with a Novak* Rooster Reversible ESC. The Rooster comes with a Futaba* J plug, Bullet/Tamiya-style motor plugs and standard battery plug.

After changing the receiver plug and installing the three motor capacitors (included with the Rooster), I hooked up the Rooster to a Motor Man* 1400 SCR battery pack. Programming the Rooster was so simple! Just

push the setup button, pull full throttle and push full reverse—no dials, no neutral plots, no confusion. The Rooster automatically adjusts itself to your radio.

PERFORMANCE

To test my Vectra, I went to R/C Sports in Vacaville, CA. They have a huge, permanent parking-lot racetrack. It's a terrific spot to race and practice, and because it's an outdoor asphalt track, there's no usage fee. Yeah—drive for free!

The Vectra was raring to go. After making some last-minute steering adjustments, I pulled full throttle, and it bolted off at full speed. I was amazed at how fast the car was, especially with the stock motor. I know that torque-steer can be a problem with FWD cars when you accelerate too fast, but I didn't notice it in the Vectra, at least, not in stock form. In stock form, when you pull full throttle, the car goes off in a straight line. If I put a racing motor in the Vectra, it's possible that the problem will arise because none of the Tamiya FWD sedans come with slipper clutches. Remember: these sedans were made for parking-lot racing, not full-blown, all-out modified racing. You'll be surprised at how well you can do with a stock car at a parking-lot race. What you really need is skill—not a modified car or a bloated wallet, although having both would be nice.

The Vectra's performance was excellent. It took all the turns in stride and never spun out. Even when you turn the wheel and suddenly accelerate, it can't spin out. I discovered that the Vectra can accelerate harder through the turns and stop a lot faster than its rear-wheel-drive counterparts. Of course, front wheel drive is not the only reason for such good performance; part of the credit goes to the tires. The Vectra used Tamiya's no. 50454 Standard Slicks, and they stuck to the asphalt like roadkill. The only downside to front wheel drive is that the front tires tend to wear twice as quickly as the rear tires. You'll have to rotate the tires every 6 to 8 runs so that they wear evenly.

FINAL THOUGHTS

Like all of its Tamiya FWD predecessors, the Opel Vectra is a great parking-lot racer. The body and decals are gorgeous. Not only is the Vectra a beauty, but it's also a beast. Even with stock electrics, this car is fast. So if you're into parking-lot racing, or if you're thinking about joining in on the fun, the Tamiya HKS Opel Vectra JTCC is a great car to start with and stay with.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

Fill and Bleed Shocks



by TOM ANDERSON

BLEEDING YOUR CAR or truck's shocks properly is more important than you may think. If a shock is not bled correctly, it will either have too much air in its body, or suffer from "hydraulic lock," which occurs when the shock is filled with too much oil, which stops the shock shaft from extending all the way into the shock body. Not only does hydraulic lock limit the shock's upward travel, but it can also make your car or truck jump and handle bumps poorly. If there is too much air in the shock body, it will feel as if it has 5W to 10W lighter oil than it actually has. A shock with a lot of air in it will also provide inconsistent damping and make your vehicle handle inconsistently.

Before I explain how to properly bleed the different types of shock, let me explain why it's important to fill your shocks with

the right amount of oil. When a shock is fully extended, i.e., when the shock shaft is all the way out, the shock body can't be completely filled with oil. Here's why: when the shock shaft is pushed into the shock body, it displaces the oil in the shock. This is similar to what happens when you fill a bathtub with water and then get into it. The water level rises, right? This is because when you get into the tub, you displace the water. There needs to be room in the shock body for the oil and the shock shaft when the shock is fully compressed.

The point is that when you bleed a shock properly, there will be just enough room for the shaft to be completely inserted. When the shaft is inserted all the way, the shock body's volume is completely taken up.

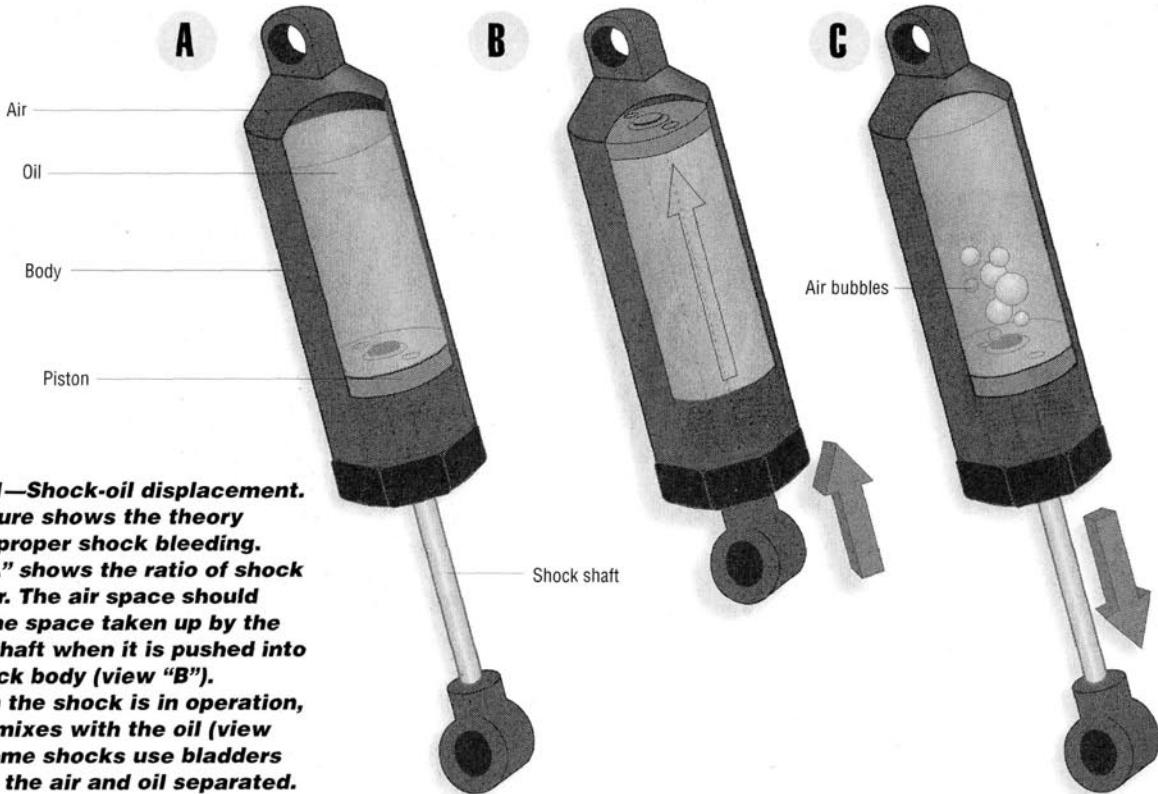


Figure 1—Shock-oil displacement.
This figure shows the theory behind proper shock bleeding. View "A" shows the ratio of shock oil to air. The air space should equal the space taken up by the shock shaft when it is pushed into the shock body (view "B").

When the shock is in operation, the air mixes with the oil (view "C"). Some shocks use bladders to keep the air and oil separated.

LET'S GET BUSY

Enough hoopla about how shocks work. Now I'll show you how to bleed some of the more popular shocks. This article is divided into sections dealing with different types of shock. Find the type you use, and read that section. If your shock isn't listed, find one that is similar, and try the methods described for that one.

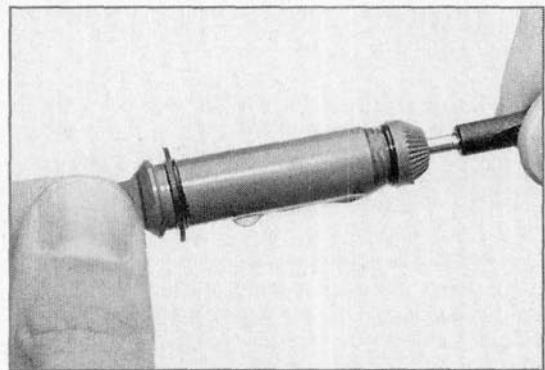
One more thing: if you race outside during the day, it's a good idea to bleed your shocks at the track. If you bleed your shocks in your house or in your hotel the night before, chances are they will have to be bled again at the track the next day. Difference in temperature affects the volume of oil inside the shock when bleeding it: if it's hot outside, it takes less oil to fill the shock; if it's cool, it takes more. I'm sure it's cooler inside your house or hotel room than it will be at the track (unless you live near the North Pole or race in the snow). Conversely, if it's colder at the track than at your home, you'll need more oil to fill the shock. As a rule, fill and bleed the shocks in an environment that's the same temperature as that of the track on which you'll be running.

Schumacher

Schumacher shocks are threaded from the bottom, and they have a compensation chamber (see sidebar), and they're bled differently from other shocks.

Fill the shock body up to where the threads start inside the shock body. Thread the cartridge into the shock body about one full turn. Slowly push the shaft into the shock body until only about $\frac{1}{4}$ inch of it remains outside the body. With the shaft in this position, tighten the cartridge all the way.

When the shaft is pushed all the way in and released, it should



After you've threaded the cartridge on about one full turn, slowly compress the shock all the way, and fully tighten the cartridge.

return to nearly full extension. If it can not be pushed all the way in, there is too much oil in the shock. To bleed it properly, loosen the cartridge and follow the above procedure

again. This time, push the shaft in slightly farther before tightening the cartridge.

Traxxas and Kyosho

These two shock designs use a rubber bladder that sits inside the shock cap to compensate for the oil displaced by the stock shaft. This simple compensation works fairly well. But when you run your vehicle on extremely bumpy surfaces, the shock tries to work faster, and the bladder can actually make the



The bladder installed inside the cap on the Kyosho and Traxxas shocks compresses as the shock shaft enters the shock body. As the shaft is pulled out, the bladder expands back to its original shape.

shock resist being compressed and make it rebound faster than normal. There simply isn't much force applied to the shock because the car weighs only 4 pounds or so.

Many racers modify these types of shocks, or remove the bladders completely. To modify the shocks, they drill a small hole ($\frac{1}{16}$ inch or smaller) in the shock cap to allow air to escape freely and be drawn into the bladder's air chamber. But drilling a hole is risky because you then have to rely on the edge of the bladder to seal the top of the shock. There is a chance that the bladder will shift while you are driving and all the oil will squirt out through the hole (it has happened to me). The result is a car that's really hard to drive, though it does make for a cool jumping-frog impression as your car hops around the track. Unless you



Drilling a small hole in the cap of a shock that has a bladder can slightly reduce how much your vehicle bounces. Be careful when you make this modification, because oil can leak through this hole if the bladder seal isn't good.

are a racer who wants every possible advantage, I don't recommend that you remove the bladder or drill a hole in the cap. The bladder makes the shocks really easy to bleed.



A shock that has a bladder in the cap should be filled to about $\frac{1}{8}$ inch below the top of the shock.

If you remove the bladder, follow the procedure for bleeding Associated shocks. If you decide to keep the bladder, with or without a hole in the cap, follow these steps. Fill the shock body about $\frac{3}{4}$ full of oil. Slowly move the shaft up and down to get air out from under the piston. Fill the shock body completely, and thread the cap on all the way. Loosen the cap $\frac{1}{2}$ to $\frac{3}{4}$ turn, and slowly compress the shock all the way. With the shock fully compressed, tighten the cap.



Screw the cap on about one full turn, and slowly compress the shock all the way; then bleed the excess oil, and fully tighten the cap.

Volume-Compensating Shocks?

Some of the shocks available today have features that let them compensate for the oil displaced by the stock shaft as the shock is compressed. Volume compensation allows the shock body to be completely filled with oil while the shock shaft is fully extended. When working properly, volume compensation can be a real advantage since the shock body never has air inside it. One of the problems I've encountered with compensation is that the force we are applying to the shocks isn't great enough to "overcome" some of the methods used. The best compensation-type shocks I've seen are the old, original Team Losi shocks with the larger cartridge and the newer Schumacher shocks with the foam inserts.



The cleverly designed Schumacher shock uses a piece of foam to compensate for the displaced shock oil when the shock is compressed.

Team Losi's original shock design used a floating O-ring with a spring, resembling shocks used on full-size vehicles. When the shaft was pushed into the shock body, a spring was compressed to allow the O-ring to move, and that increased the capacity of the shock body. As the shaft moved out, the spring extended, pushing the O-ring back out and decreasing the capacity. There were two disadvantages to this design that eventually led to the use of the current non-compensating, double-O-ring cartridges. The first problem was that the O-ring needed to have as little drag as possible for the shock to operate correctly. The result was a shock that leaked more than usual. The second problem was space. The cartridge assembly with the spring took up more space than a standard seal assembly. To have the same amount of travel as a standard shock, these shocks had to be nearly $\frac{1}{2}$ inch longer.

The Schumacher shock works with a piece of open-cell foam. As the shaft is inserted, the oil is forced into the foam. As the shaft is pulled out of the shock, the foam pushes the oil back out and into the shock body. This is a very effective method of compensation that still allows the shock's O-rings to seal well, but like the Losi design, it requires a little extra space in the shock.

FILL AND BLEED SHOCKS

Team Losi

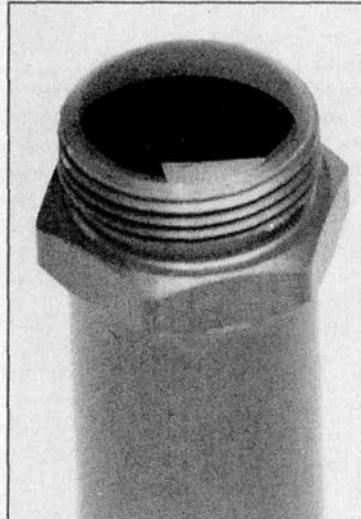
Team Losi shocks don't have a cap; instead, they have a cartridge that contains all the O-rings and seals. This cartridge threads onto the bottom of the shock body. This makes these shocks really easy to bleed. Fill the shock with oil up to where the threads start inside the shock body. With the shock shaft all the way out so that the piston is against the cartridge, thread the cartridge into the shock body about one full turn. Slowly push the shaft all the way into the shock body. With the shaft all the way in, fully tighten the cartridge.

After the shaft has been pushed in all the way, it should rebound about $\frac{1}{8}$ to $\frac{1}{4}$ inch, and if the shaft is pulled out all the way, it should pull back in about $\frac{1}{8}$ inch when you let go of it. If the shock can't be compressed all the way, loosen the cartridge and follow the above procedure again.

Fill Schumacher and Losi-type shocks only to where the threads start.

Associated

With the shock fully extended, fill the shock body about $\frac{3}{4}$ full of oil. Slowly move the shock shaft up and down a few times to make sure there is no air under the piston. Pull the shock shaft all the way out again, and fill the shock body so that the oil actually bubbles slightly over the top. Thread the shock cap onto the shock body about 1 to $1\frac{1}{2}$ turns. Slowly push the shock shaft into the shock body while twisting the shock cap back and forth about $\frac{1}{4}$ turn. Do this until the shaft is completely bottomed out. Tighten the cap all the way with the shock in this position. Extend the shock, and compress it. If there's air in the shock, add more oil and bleed it again. If the shock doesn't bottom out, repeat the above procedure until the shock can be compressed all the way with the cap tight. When the shock has been properly bled, the shaft should rebound $\frac{1}{8}$ inch after it has been fully compressed.



An Associated shock—a shock that has a screw-on cap without a bladder—should be filled slightly over the top so that the oil forms a slight dome.

THAT'S A WRAP

Well, I think that about covers it. While bleeding your shocks, it's a good idea to have some rags handy (I'm not talking about Mom's dish towel either!). The excess oil can make quite a mess if you aren't careful. Keep a couple of those old rags in your toolbox to use when you bleed your shocks at the track. Be sure to wipe off all the excess oil when you've finished. The oil can attract dirt and make a big mess in a short time.

It's important to bleed the front shocks equally and the rear shocks equally so that each set has the same amount of return pressure. Otherwise, your vehicle will perform very strangely.

Five Models With the Power to

All "classic" cars have one thing in common: while they look sensational, they run even *better*.

That also holds true for Kyosho's Nostalgic Series R/C models. Sure, you'll be impressed by the detail of their scale exteriors. But when you pull back on the throttle, you'll be absolutely blown away.

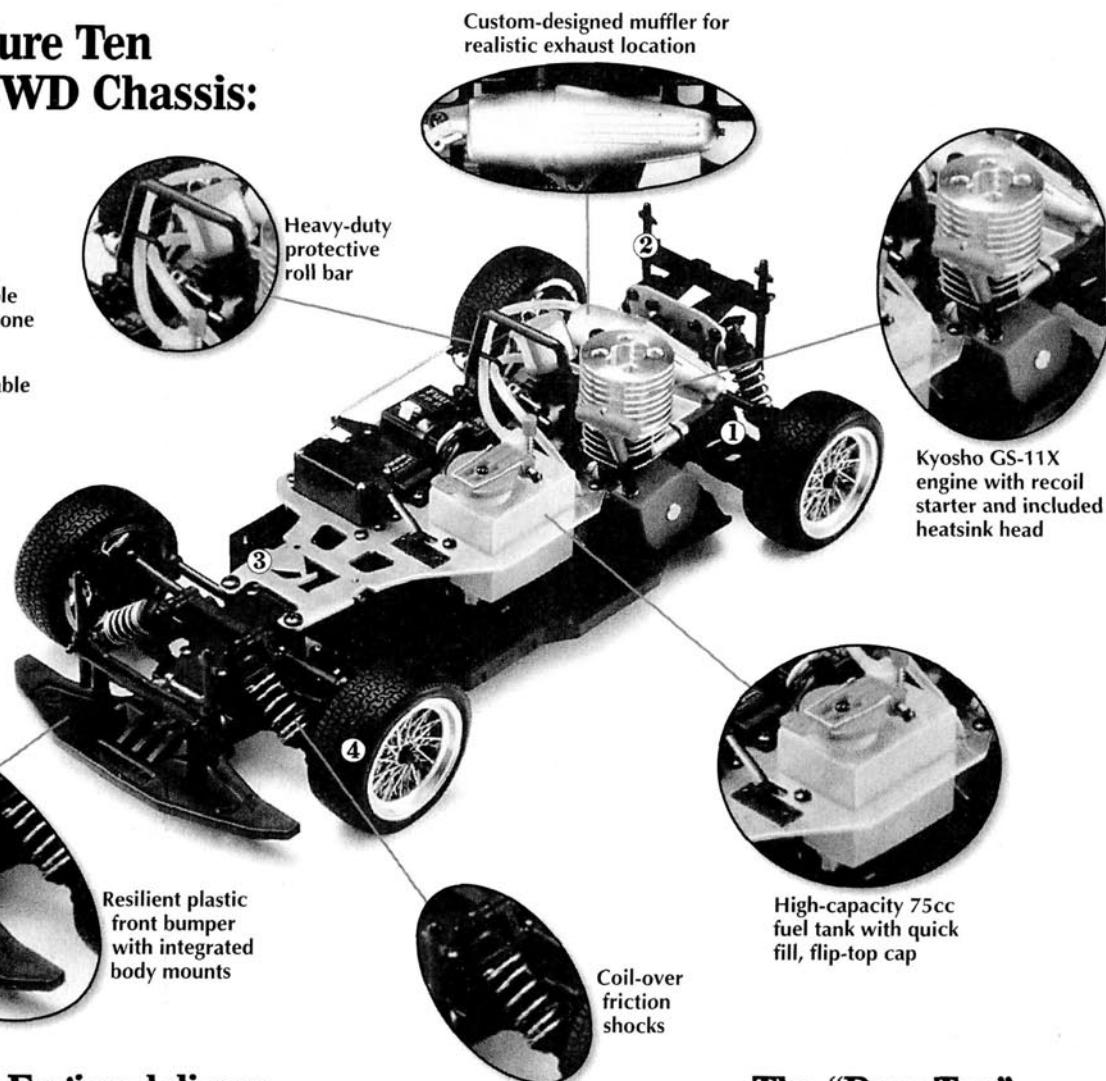
Each nitro-powered 4WD Nostalgic Series racer features Kyosho's GP Spider chassis...rated by R/C

Model Cars magazine — "on a scale of cool" — at "way cool!" Every component seems custom-designed for easy adjustments and maximum on-road power. Examine it for yourself below.

Such outstanding R/C technology makes Nostalgic Series cars classics in their own right...perfect for racing in parking lot contests, or just burning rubber down Memory Lane.

Inside the Pure Ten GP Spider 4WD Chassis:

- ① 4-wheel independent double wishbone suspension with one piece molded tie rods
- ② Body posts that are adjustable with a single set-screw
- ③ Radio Tray that acts as a chassis stiffener
- ④ High-grip radial tires with realistic wheels



Included GS-11X Engine delivers power and convenience:

- Built-in recoil starter makes starting quick and easy
- Easy-access needle valve simplifies adjustments
- Comes with heatsink head and air cleaner
- Bolts directly to the mounting plate — no mounting blocks needed
- Custom designed muffler increases scale looks with realistic exhaust location

Specifications — Pure Ten GP Spider 4WD Chassis

Length: 18.4 in (467.3 mm) Width: 8 in (203.2 mm) Height: 4.96 in (126 mm) Wheelbase: 10.4 in (264.1 mm) Weight: 3.4 lb (1542.2 g)
Engine: Kyosho GS-11X w/recoil start (included) Requires: 2-channel radio w/2 servos, glow fuel, glow starter

The "Pure Ten" Designation:

"Pure Ten" refers to a style and size of R/C car that is closer to scale and much more detailed than any other body/chassis configuration. Pure Ten chassis accept most "narrow" bodies from other manufacturers.





IMAGINE AN arena in ancient Rome. The stands are packed with spectators who have come to see gladiators battling to the death, hoping to gain some vicarious thrills in the clash of metal against metal, skill against skill. Suddenly, the crowd roars as trumpets blare, the gates open, and the first two combatants enter the ring. Warily, the warriors circle each other,

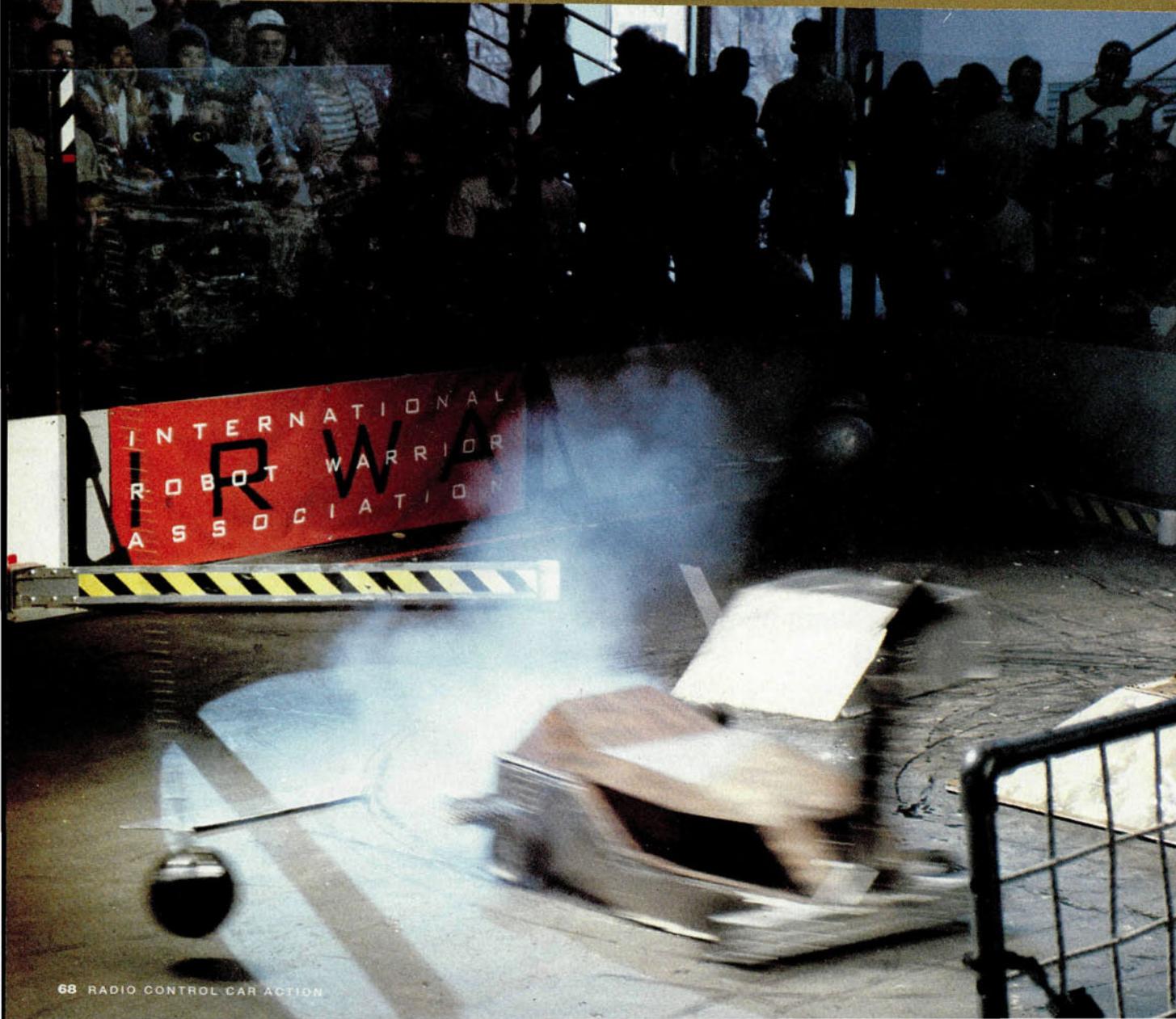
each seeking an opening for the attack, until with a mighty rush, they smash together in mortal combat, and sparks fly as weapon strikes weapon.

Now take this scenario—crowd and all—move 2,000 years forward in time, and plop it down in the middle of a large

by Rob Wood

Robo

warehouse in San Francisco. Replace the trumpets with concert-level recorded rock music, add some special effects and theater lights, and you've set the stage for one of the most amazing sport-



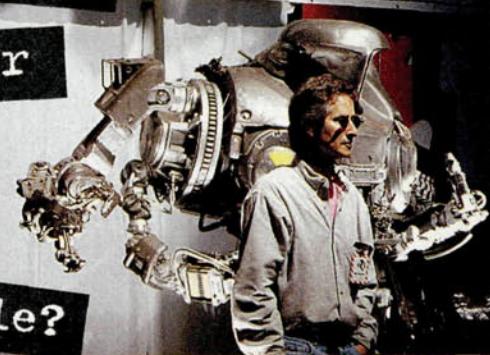
Is your radio controlled

ROBOT WARS

gladiator

ready

for battle?



Is Robot Wars creator Marc Thorpe standing in front of a future contestant?

ing events to come along in many years. This time, when the gates open, the gladiators who trundle out into the arena aren't human—far from it; these warriors are made of aluminum and steel;

they run on tracks and wheels; and they're controlled by R/C car radios. In short: these warriors are robots, and the world in which they struggle is called Robot Wars!

Robot Wars Excessive Violence or Escape Valve?

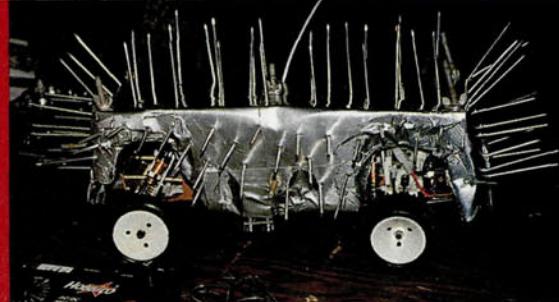
by Marinela Miclea

The closer you get to the arena, the louder is the roar of the crowd. Your heart quickens, and you hurry to get in. Whether you're male or female, young or old, you soon find yourself caught up in the action. Welcome to the Robot Wars—a 20th century reenactment of the infamous Roman gladiator fights.

Some people feel that this is just another form of boxing, except that these are robots rather than people throwing punches. To others, seeing robots duking it out sounds like a great way to take out frustrations! What is undeniable is how quickly skeptics become believers (or even contestants) when they attend one of these exciting events. The drama of the action and the strategy behind the diverse robot forms are the main crowd-pleasers.

Whether you think the Robot Wars sound like fun or you're appalled by the idea, you'd better get accustomed to it. The organizers envision

Robot Wars becoming a popular TV sport like Monday night football and boxing specials all rolled into one—with Mike Tyson-like robot hulks battling it out in the desert. And guess what: it just might happen!



Above: creativity can overcome a lack of finances. "Spiny Norman" lived through two years of competition and was made of nothing more than a Tamiya truck chassis and an aluminum bread pan with nails stuck through it.

Left: "Ramfire"—the heavyweight class winner of the first Robot Wars (1994)—featured a hydraulic battering ram.

Below: the heavyweights included "Thor," which can smash a heavy arm down on its opponents (foreground). Ultimately, though, Thor was no match for La Machine (left background), which pushed its wedge-shaped nose under Thor's chassis and lifted it so that it was helpless.



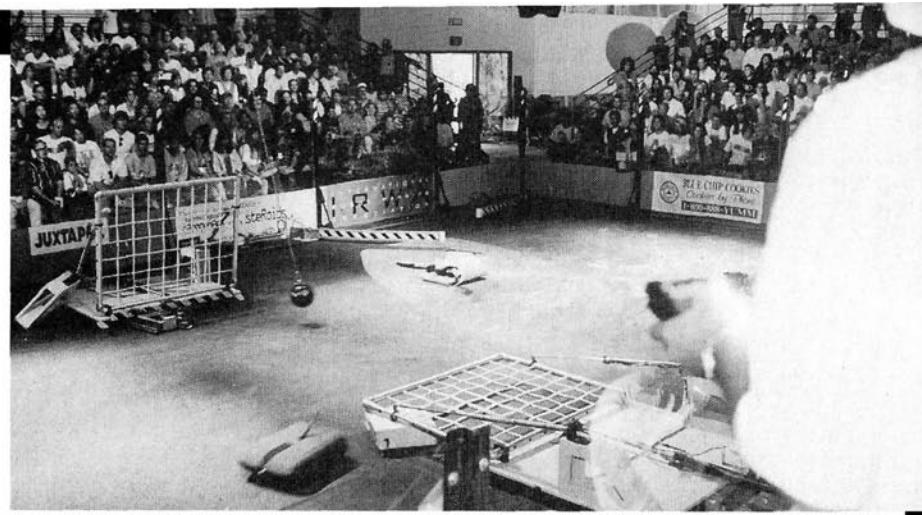
Robot Wars

Robot Wars is the brainchild of Marc Thorpe, former chief model maker at Industrial Light and Magic—George Lucas's special-effects company. According to Thorpe, Robot Wars grew out of a failed experiment to invent a practical—and fun—R/C vacuum cleaner. "But it wasn't more fun, because it didn't vacuum very well," Thorpe explains. "So I thought it would be interesting to remove the vacuum from the vehicle and, instead, mount a power tool on it, like a saw, and send it into combat."

He was still toying with the idea of staging competitive robot combat events when *Model Airplane News* columnist Jef Raskin got wind of the project and wrote about it in *HotWired!*, the online version of *Wired* magazine. The resulting flood of e-mail convinced Thorpe that there might be a market for this type of entertainment, so he teamed up with music promoter Gary Pini, who convinced his three partners at sm:)le communications that the concept was a winner. The partners put up the money and joined forces with Thorpe to stage the standing-room-only event at Ft. Mason, a popular event site on San Francisco's waterfront.

Although teams from Industrial Light and Magic, NASA, Colossal Pictures, U.C. Berkeley Engineering and robotics companies entered some pretty elaborate (and expensive) machines, Robot Wars competition is open to anyone with a tinker's heart and a competitive spirit. Ranging in size from superlight (a Tamiya truck chassis with a bread pan for armor, for example) to heavyweight (custom-built monsters weighing over 100 pounds and equipped with gas-powered grinders and chain saws), there's a level and place in Robot Wars for everyone.

The object of these matches isn't necessarily to destroy your opponents; points are awarded for merely disabling the competition for 30 seconds. This means that you can win your class simply by flipping the other robots over onto their backs or pinning them against the safety barrier. To the delight of the spectators, the winner of this year's combat was a robot with the deceptively mild name of "La Machine." Originally entered in the middleweight class, La Machine had no offensive weapons; its wedge-shaped



As if the perils of competing against other robots with that "killer instinct" weren't enough, the arena comes with radio-controlled snares, slamming arms and swinging bowling balls.

body was designed to overturn its opponents. After winning the middleweight class, team captain Greg Munson asked if he could enter La Machine in the heavyweight Melée (multi-robot group combat) against The Master and Thor—much larger, heavier robots equipped with offensive weapons. La Machine triumphed!

Complicating the perils of open combat, the arena is full of traps that spring closed randomly, "housebots" that join in the fighting, and a swinging bowling ball that can crush a hapless robot that happens to be in its path. Although, when the robots grapple, it looks like mass destruction in the arena, in truth, when all the smoke has settled, very few of the robots appear to have suffered permanent damage; and watching the feverish repairs in the pits is part of the entertainment.

When it's all added together in the ring—chain saws roaring, sparks flying, claws crushing, pneumatic hammers delivering punishing blows and—believe it or not—even an R/C balloon dropping a net to trap robots below, Robot Wars is a "smashing" success. Until you've seen and heard 2,000 people jumping to their feet and screaming with excitement, you can't really imagine that an R/C event could generate such wild enthusiasm.

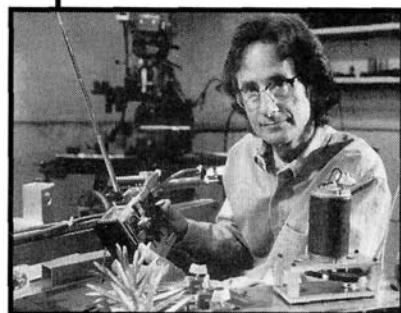
There is another side to this drama, however, and it revolves around the subject of violence. With all the media attention being given to violence in entertainment, these days, Robot Wars might seem like the ultimate in violent self-indulgence. Marinela Miclea, who helped me cover the event, interviewed Robot Wars creator Marc Thorpe about it.

Violence, excitement, entertainment, fun; the distinctions begin to blur. One thing is certain: Robot Wars is an incredible phenomenon and is likely to continue

by Marinela Miclea

Marinela: Is Robot Wars a sport, or is it simply entertainment?

Thorpe: Sports involve a certain basic drama about survival, being able to prevail, being able to demonstrate skill, power, strategy, intelligence. People like to see those human elements played out in a theater,



Marc Thorpe

and that's what a sport is. Most people don't think of sports as theater; they think that sports is sports, and theater is what you see when you go to see a play or stage show. But sports is a form of theater and it is a drama that's playing out where there are winners and losers.

Marinela: But what do you say to people who are upset that Robot Wars is a violent sport?

Thorpe: The thing about sports is that people are out there doing this stuff and they get injured. In some sports the objective is—if not to injure—at least to incapacitate or cause a physical problem such that you have an advantage. A lot of people have a problem with that. I'm a sports fan; I like sports. But this is an event

INTERVIEW WITH THE
CREATOR



Greg Munson (left) won the mid-weight class and was then given permission to join the heavies with his La Machine. This robot was strictly defensive, and its success proves that the "KISS" principle still rules! (keep it simple, stupid!).

where you have all those elements playing themselves out: violence, aggression, conflict resolution, and no people are getting hurt. So it's a license to explore and be involved in a kind of fundamental, mythical kind of drama, without any of the social or other kind of stigmas that you find in sports like boxing, where the same thing is happening but there are people getting hurt.

Marinela: You know there is an ongoing debate about violence: that perhaps the media shouldn't focus so much on programming violence. Do you feel that this is an escape valve or do you feel that it's gratification?

Thorpe: People tend to not really think about the meaning of words. For example, "I'm against violence." Ask the person who says he's against violence how he feels about lightning: it's a form of violence, it's a physical violence. In all sports, there are two types of violence; look at baseball and football. In baseball, you have the kind of violence where the bat is hitting the ball and you hear a big crack; that's a violence that's like lightning striking a mountain. There's also a "crack" in football: You can hear that crack but it won't be from a bat hitting a ball; it'll be from a helmet hitting a knee. Robot Wars is like the violence that's in baseball where a bat hits the ball. I'm a sports fan. I like football; I even like boxing sometimes. The healthy thing is if you're going to celebrate violence, to celebrate violence between things and not between people. And in that sense it's a very healthy kind of

FACE-OFF—ONE-ON-ONE COMBAT

CLASS (WT.)	ROBOT	TEAM CAPTAIN/OWNER	PRIZE
Superlight	HMM	Rick Winter	\$200
Light	Test Toaster	Jeff Bowden	\$300
Middle	La Machine	Greg Munson	\$500
Heavy	The Master	Mark Setrakian	\$1,000

MELÉE—GROUP COMBAT

Superlight	HMM	Rick Winter	\$200
Light	Hitty Puff Puff	Will Wright Maxis	\$300
Middle	La Machine	Greg Munson	\$500
Heavy	La Machine	Greg Munson	\$1,000

BEST DESIGN: The Master—Mark Setrakian, who also won in '94 (\$250).

BEST ENGINEERING: (a tie) Thor—Andy Lyons (Schilling Robotics Systems—\$250); Blendo—James Hyneman (Colossal Pictures—\$250).

STRANGEST ROBOT: SPS 2—J.D. Street (\$250).

thing, because you're not going to eliminate violence; you're not going to eliminate conflict. It's a natural phenomenon. Celebrate those things where there are no casualties as a result of that celebration, and recognize the different part of violence that is directed towards people and put a lid on that. You've got guns and you've got squirt guns; keep the squirt guns and get rid of the real guns.

Marinela: What's your hope for the future of Robot Wars?

Thorpe: We hope that it will grow like any other business venture into something that can expand and become more available, more accessible for people to participate in it, where they don't have to travel across the country to compete, and that we'll have championships, maybe in San Francisco, and regional events around the country.

We also asked Gary Pini to describe his vision of the future for Robot Wars.

Pini: Oh, I just think it's going to get bigger, and it'll be something that can go on tours. You can put it all in a truck and go to cities. I get letters from people all the time, from people who own arenas all over the country who say, "Oh, please, everyone in our town is saying: 'Why can't we book that here?'" So I get that kind of request all the time. I think we can let the robots get bigger every year, increase the weight; and eventually we can get really big ones and do it out in the desert and have it on TV with the really giant ones fighting it out in the

desert.

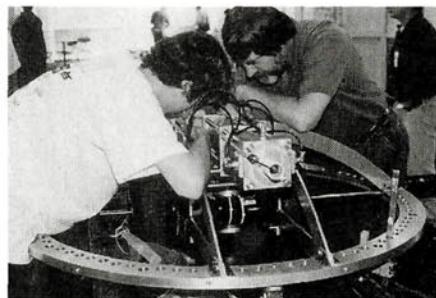
The word "robot" conjures up an image of an autonomous contraption with a personal identity—along the lines of R2D2 or CP30—but the robots competing in this event are actually radio-controlled via R/C car radios. What about the idea of autonomy? Could robots be programmed to seek out and destroy other robots? The answer, of course, is "Yes." How strange it would be to attend an event like Robot Wars and watch autonomous machines go at each other.

Marinela: I heard a few contestants saying they plan to submit autonomous robot entries next year.

Pini: Yes, that's why, this year, we've got these people who were understanding that technology and they said, "Well, we don't know exactly how we can do it," and we said, "Please, just try." We need to show people that there's another way to make robots besides using an electronic control box—that you could make a robot that would operate autonomously and be able to seek other robots. We had them come and basically, today, we wanted just to show people that that was an alternative way to make one. [Author's note: two autonomous robots were entered in the competition, but there was too much interference from strobe lights and moving objects for their sensors to operate properly.] We're hoping that other people will see it and say, "Oh, yeah, I could do that; I'm going to enter," and I hope next year, we'll get more entrants in that category.



Above: Thor's team works on their awesome entry in the pits. **Left:** There's no limit to the shapes and functions of potential winners. Pincer claws look scary, but are tasty targets for less complicated contenders.



This gas-powered "Flying Saucer" could destroy anything in its path; parts literally flew out of the arena and along the length of the warehouse. Deemed too dangerous for combat, it was withdrawn from the competition.



The 110-pound "The Master" truly was the master in the heavyweight face-off. This monster has a variety of optional attachments (including a gas-powered 12-inch grinding wheel), and it also won Best Design ('94 and '95).

to grow in popularity. As a pilot for a science-fiction series called "Mentorn," the British Broadcasting Corporation will have filmed the first British version of Robot Wars by the time this article is printed. This year's event had 50 entries, and Gary Pini projects as many as 200 for next year (scheduled for the third week in August in San Francisco).

If you're interested in attending or competing in Robot Wars, contact Robot Wars, Inc. 740 Broadway, 7th floor, NY NY 10003.

Glue Tires

Seven steps for mounting off-road tires

by Frank Masi

TO GET the best performance from your off-road tires, they must be glued securely to the wheels. A tight glue joint that runs around the entire bead of the tire will ensure that you'll get the best traction. If the tire isn't held tightly to the wheel, it may flex excessively, and its sidewall may even roll under the wheel during hard cornering. Both of these conditions will cause inconsistent handling.



STEP 2

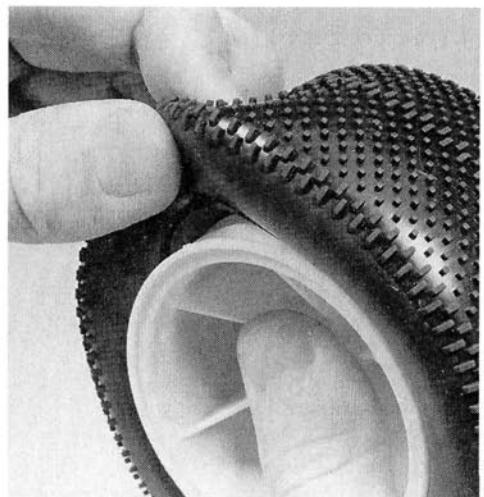
If your tires are molded of soft rubber, the manufacturer has probably included foam inserts. Use them! The inserts help the tire to maintain its shape, and they provide a backing for the tire's tread so that it can "bite" into the track's surface harder. If your tires are of soft rubber, and they don't include inserts, it's a good idea to buy foam inserts.

To prevent the tire from becoming distorted, it's recommended that you trim the edges of the foam inserts at a 45-degree angle. Small, sharp scissors work well for this, as do curved, Lexan-body trimming scissors. Doing this helps the insert conform to the inside of the tire body.



STEP 1

Dirt, oil and manufacturing residue can prevent even the strongest glues from bonding to a surface. For this reason, it's a good idea to thoroughly clean the wheel and the tire's bead. A rag soaked with isopropyl alcohol works well. Wipe off the wheel where it will contact the tire; then clean the tire's bead.



STEP 3

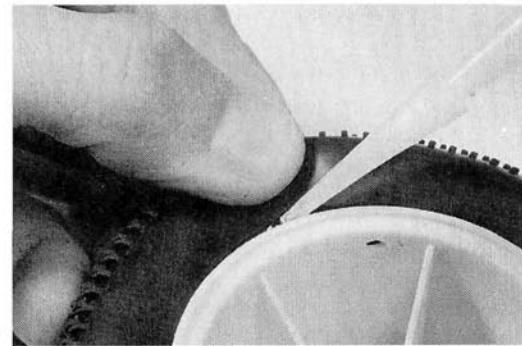
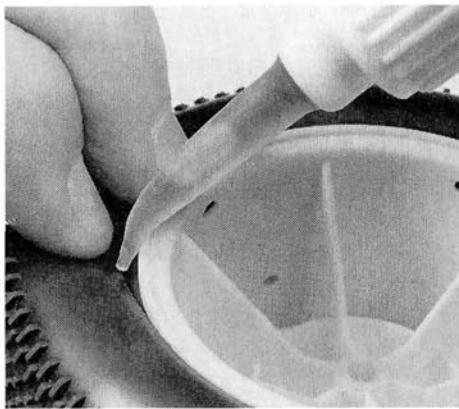
Place the foam insert inside the tire, then pull the tire and the insert over the wheel. Position the tire so that its beads lie in the wheel's channels. Gently knead the tire's tread to ensure that the foam insert is properly aligned and hasn't bunched up.

STEP 4

The tire was stretched when you pulled it onto the wheel, so give it a few minutes to return to its normal shape. Before you glue, inspect the tire/wheel joint; the tire should fit tightly against the wheel with no gaps.

Before you even open your bottle of CA, put on some eye protection. CA can spatter, especially the thinner type, and it can bond skin (and eyelids!) instantly.

Begin gluing by pulling a small section of the tire away from the wheel and applying a few drops of CA to the gap. Repeat this process, working around the wheel until the entire bead of the tire is glued securely.



STEP 5

If you've performed step four properly, a small amount of CA will have been "squeezed" out from between the tire and wheel. Tilt the tire to allow this excess glue to flow around the entire tire/wheel joint. Fill any gaps between the tire and wheel with additional CA.

Which type of glue is best?

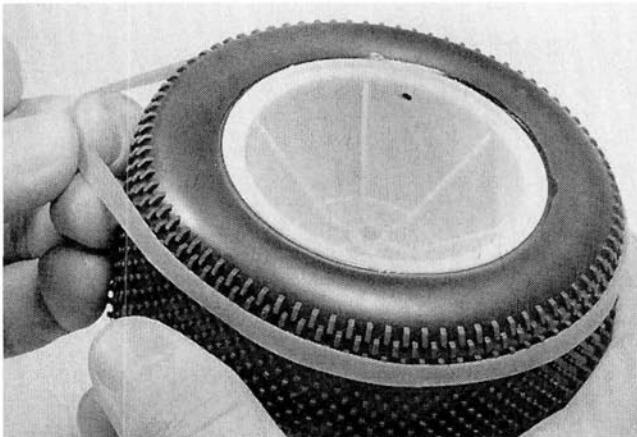
This is a very common question to which there is no single answer. In general, any type of cyanoacrylate (CA) will do the job. Some of the popular brands of CA are available from Pacer*, Motor Man* and Great Planes*. Trinity* has recently released its own tire glue under the Point Blank label.

To glue tires, I recommend that you use a medium-thick CA. This type of CA tends to provide a more flexible



joint, and it's better at filling small gaps and voids. I've had the best results when I've allowed this CA to dry overnight.

If you're in a race-day rush, you might have to use a thinner CA that dries more quickly. Thinner CA won't fill gaps as well, so make sure that the tire is seated properly to the rim before you apply glue.



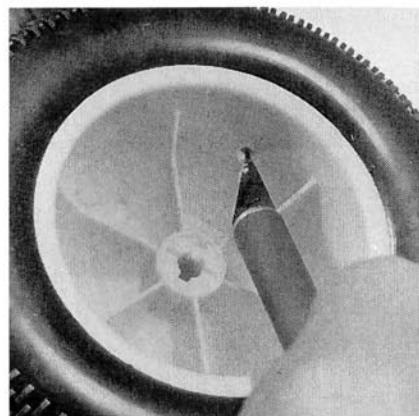
STEP 6

To ensure the best joint possible, stretch a rubber band (no. 64 rubber bands work well) around the tire just above the glue joint. The rubber band will squeeze the tire against the wheel and eliminate any gaps or irregularities. Leave the rubber band in place until the glue has set.

After the glue has dried enough so that it won't drip, turn the tire over and glue the other side of the tire to the wheel following the same steps. CA accelerators aren't recommended unless you're in a hurry. These sprays tend to make the CA brittle, which can make the glue joints crack.

STEP 7

If done correctly, your tire and wheel will be joined with an airtight seal. As a safety precaution, don't test this theory by squeezing the tire, unless you're wearing eye protection, because the pressure within the tire can spray uncured CA into your eyes. Because air must flow in and out, the tire cannot be airtight. Ventilate the tire by making two or three small holes in the wheel. An X-Acto knife works well for this job. Some wheels come with vent holes already made.



That's it! Now you won't be known as "Retread Boy" at your track because your tires are always falling off the wheels. Just remember to be

careful when you're using CA; you'll need your thumb sooner or later!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.



Interview with a Dirtinator

Few racers in the world can match the incredible record of Brian Kinwald. He has won so many national titles that it's hard to keep track; and he shows no signs of letting up!

After his decisive victories at the ROAR Off-Road Nationals, I had the chance to speak with Brian about his new titles and his performance at the world championships.

GG: You finished well at the IFMAR World Championships but weren't able to retain your 2WD title. Did this affect your confidence going into the ROAR Nats, which is an equally important title?

BK: Not really; I've made just about every A-Main at every race for the last five years. Here and there, I've had bad luck. The Worlds just happened to be one of those races. I think that, over the years, I've won so many races that people expect me to win, and if I place second, they wonder what happened. Racing is racing, and you can't win them all. I think my confidence level is the same at every race because I know my driving ability.

GG: At a big race like the ROAR Nats, are there things that you'll do to prepare yourself mentally that you wouldn't normally do at a club type event?

BK: Not mentally, but when I get up on the drivers' stand at a big race, my concentration level goes up compared to a club race.

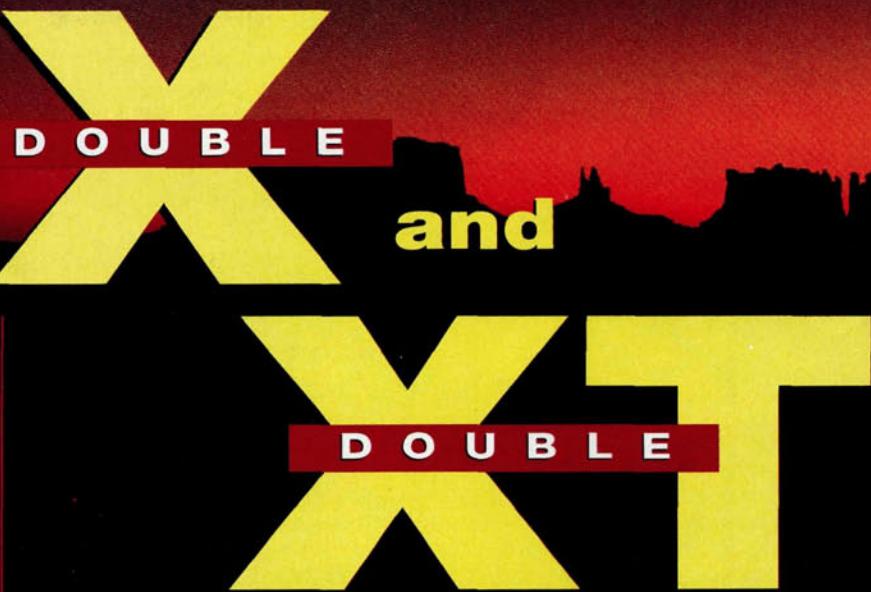
GG: How about in the preparation of your equipment?

BK: Definitely; I think at a big race, I check out my car a bit more carefully for mistakes or problems.

GG: Do you think that ROAR should make any changes for future national events?

BK: I think that national and world titles should be decided by more than one race, like they do in F1 racing events and tennis matches.

Inside Brian Kinwald's



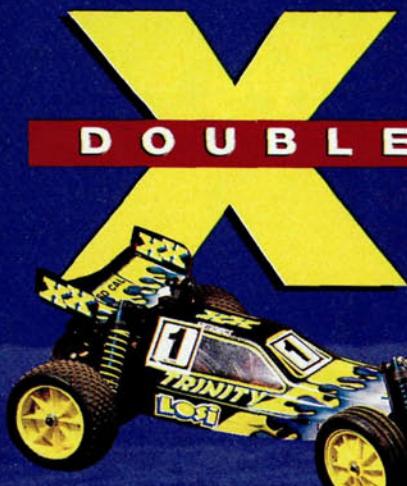
A closer look at the ROAR Nats Winners

by George M. Gonzalez

BRIAN KINWALD'S recent sweep of the ROAR Off-Road Nationals proved to the world that even if he was unable to retain his IFMAR world-championship title, he's still the dominant force in off-road. Driving for Team Trinity* and using Team Losi* vehicles, Brian convincingly captured both the '95 Modified Buggy and the Modified Truck classes—winning the first two Mains of the three-Main format in both classes.

We recently had his two winning rides sent to our office so that we could take a firsthand look at his setups, and here's what we discovered.





Brian's Team Losi Double-X is outfitted with all of Losi's weight-saving parts, e.g., standard-length graphite chassis, graphite suspension arms, graphite rear shock tower, machined lightweight aluminum motor mount, aluminum suspension balls, aluminum dogbones and aluminum top shaft. It also has Trinity/Team Kinwald lightweight aluminum screws throughout, and a complete set of Lunsford* Punisher titanium turnbuckles are part of the buggy's low-cal diet.

In the Back

The shocks have Losi's titanium-nitride shafts, no. 55 pistons, Trinity 30WT oil and soft yellow springs. Brian mounted the shock's top end in the second hole out on the shock tower and its bottom end in a modified fifth hole on the suspension arm. Brian removed the shock-mount brace material from the suspension arm and drilled a new, fourth hole where the outside joint of the brace meets the suspension arm. He then drilled an additional fifth hole between the new outer hole and the original third hole. He installed one end of the rear turnbuckles in the no. 5 hole on the rear bulkhead and the other end in the no. 2 holes on the axle carriers. Brian also used the optional no. 4 pivot support and Losi IFMAR mini-step-pin rear tires. A Trinity/Team Kinwald transmission brace is used to strengthen the transmission/bulkhead connection.

The Electronics

Brian used Trinity 30A World Tech 1700 Sanyo cells, a 12-turn Dirlinator motor and a Novak* Tempest ESC. He found that an 84-tooth spur/19-tooth Trinity/Team Kinwald Hard One pinion provided the perfect gear ratio for the Savannah track. Brian also used his Airtronics* Caliber transmitter and 94155 high-speed servo, but he opted to use a Futaba* 3-channel FM receiver instead of the Airtronics unit. Brian topped off his ride with a Jammin* body, which was custom-painted by Mike Weed of Weed Designs*.

In the Front

The shocks have Losi's titanium-nitride shafts, no. 56 pistons, 0.090 limiters (inside), Trinity 35WT oil and green springs. He mounted the shock bottom in the middle hole on the suspension arm and its upper end in the second hole out on the shock tower. Brian also used a Trinity/Team Kinwald, machined-aluminum front-suspension-arm brace.

Brian's optional 25-degree caster blocks and new steering-system components keep Brian's buggy pointed in the right direction. (He mounted the ball joint on the outside mounting hole of the new bellcrank arm.) Losi's Gold, wide-body ribbed tires proved to be the hot ticket for the slick, Savannah track.



Parts List

- Airtronics 94155 high-speed servo—94155
- Futaba 3-channel FM receiver—FP-R103F
- Lunsford Punisher titanium turnbuckle kit—PS80
- Novak Tempest Pro—1760
- Team Losi Standard length graphite chassis—A9902
- Rear graphite shock tower—A9813
- Graphite suspension arms—A9701 front A9801 rear
- Light machined-aluminum motor plate—A9920
- Aluminum suspension balls—A9940
- Aluminum dogbones—A9924
- Aluminum top shaft—A9930
- 25-degree caster blocks—A1121
- Tires (F) Gold wide-body ribbed—A7202G
- Tires (R) Silver IFMAR mini-step-pin—A7373S
- 84-tooth spur gear—A3904
- Springs (F) Green—A5132
- Springs (R) Yellow—A5148
- Titanium-nitride shock shafts—A5060 front 5062 rear
- Trinity 12-turn Dirlinator modified motor—KD0312
- 30A World Tech 1700 SCRC Sanyo 6 cell pack—EXW378
- Silicone shock oil (F/R): 30WT/35WT—RC7630/RC7635
- Lightweight blue-anodized aluminum screws—3001
- Team Kinwald transmission brace—3003
- Team Kinwald machined-aluminum front-suspension-arm brace—3002
- 19-tooth Kinwald Hard One pinion—TK4819

In the Back

Brian set up his shocks with Losi titanium-nitride shafts, no. 56 pistons, Trinity 30WT oil and pink springs. He mounted the top end of the shocks in the second hole from the outside on the shock tower and the bottom end in the outside hole on the suspension arms. He mounted one end of the rear camber rods in the no. 5 mounting hole on the rear bulkhead and the other end in the no. 2 mounting hole on the rear hub carriers. A number 4 pivot support and Losi Silver IFMAR pin rear truck tires finish off his rear-end enhancements. The same Trinity/Team Kinwold transmission brace is also used on the truck as it is on his buggy.

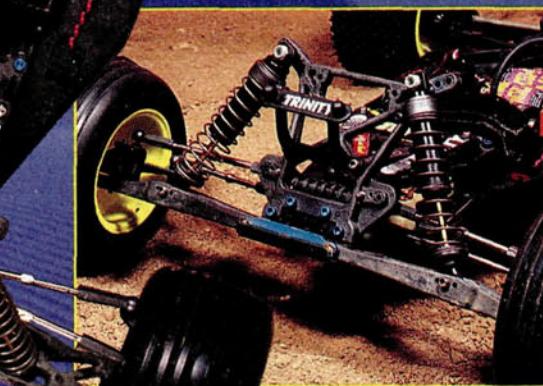
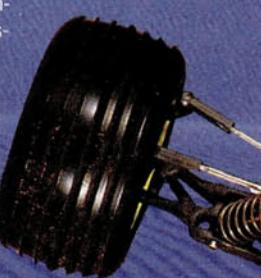


The Electronics

Except for the 13-turn Dirtinator motor and a Trinity 30A World Tech 7-cell battery pack, the electronics are the same as those in the buggy. Brian geared his truck with an 87-tooth spur gear and an 18-tooth Trinity/Team Kinwold Hard One pinion, which gave him the best compromise between out-of-the-corner punch and flat-out top speed. Brian's Double-XT is outfitted with the stock body that was custom-painted by Weed Designs.

In the Front

He set up his front shocks with Losi titanium-nitride shafts, 0.060 limiters (inside), no. 56 pistons, Trinity 35WT oil and pink springs. He mounted the shock's top end in the third hole from the outside on the shock tower, and the bottom end is in the middle hole of the suspension arms. Losi Silver, directional, truck front tires round off his front-end modifications.



Brian used all of Team Losi's weight-saving components as well as a complete set of Trinity/Team Kinwold lightweight blue-anodized aluminum screws and Lunsford Punisher turnbuckles. To make it easier to control with 7 cells on the slick Savannah track, he lengthened it by approximately $\frac{1}{4}$ inch. He did this by cutting his chassis in half and adding a $\frac{1}{4}$ -inch piece from another chassis plate. On top of the chassis, he added strengthening braces to prevent the pieces from coming apart during hard driving. [Editor's note: Team Losi does not recommend this modification because it will adversely affect the chassis' reliability.]

Parts List

Airtronics
High-speed servo—94155
Futaba
3-channel FM receiver—FP-R103F
Lunsford
Punisher titanium turnbuckles—PS86
Novak
Tempest Pro—1760
Team Losi
Graphite long chassis with braces—A9903
Suspension arms: graphite (F/R)—A9709/A9809
Shock towers: graphite (F/R)—KD0313

972/9821 Light machined-aluminum motor plate—A9920
Aluminum suspension balls—A9940
Aluminum dogbones—A9926
Aluminum top shaft—A9932
Tires (F): Silver directional ribbed—A75055
Tires (R): Silver IFMAR pin—A7638S
88-tooth spur gear—A3908
Springs (F/R) Pink—A5150
Shock shafts (F/R): titanium nitride—5062/5062
Trinity 13-turn Dirtinator modified motor—KD0313
30A World Tech 1700 SCRC Sanyo 7-cell pack—EXW379
Silicone shock oil (F/R): 35WT/30WT—RC7635/RC7630
Blue-anodized light-aluminum screws—3000
Team Kinwold transmission brace—3003
Team Kinwold machined-aluminum front-suspension-arm brace—3002
18-tooth Kinwold Hard One pinion—TK4818
Point Blank CA to glue the chassis—P908

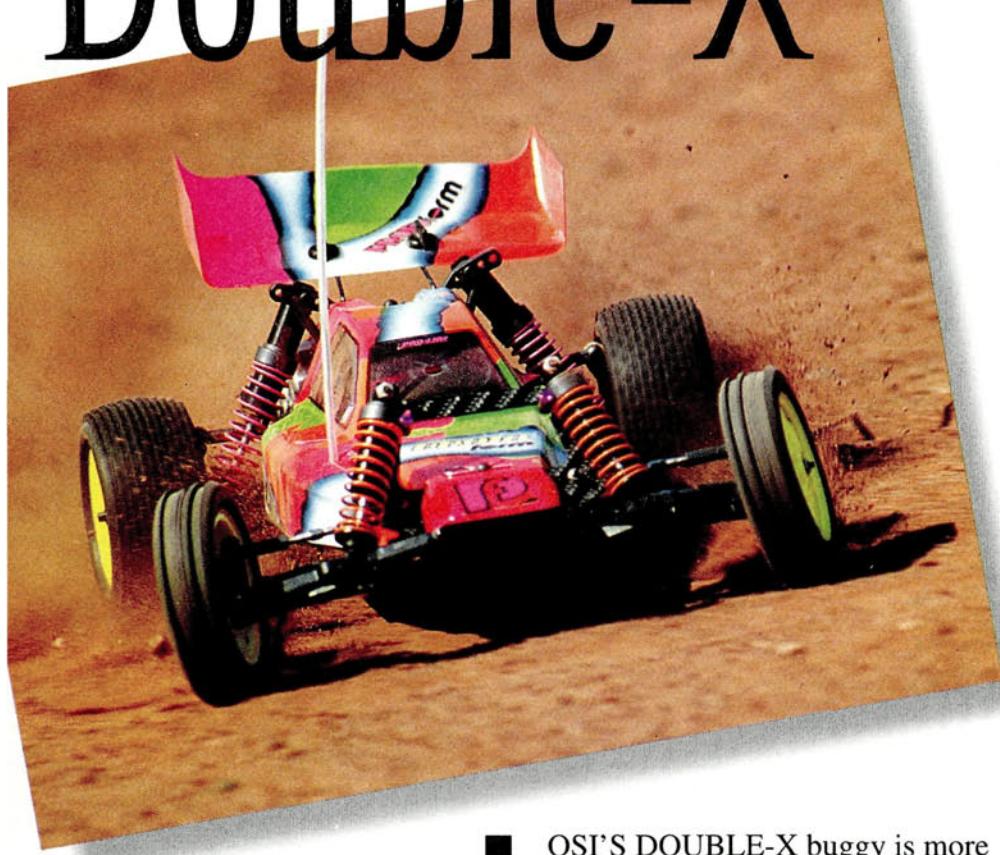
DOUBLE XT



*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

Tuning and modifying the

TEAM LOSI Double-X



by Frank Masi

IOSI'S DOUBLE-X buggy is more than capable of winning races right out of the box; but any racer will tell you that half the fun of racing is trying out different setups and aftermarket parts in the quest for more speed!

Want More Steering?

When you've made the modifications listed in this article and have tried my setup, you'll notice that your Double-X buggy has more steering

than it did in stock form. If, however, you want even more steering, try this trick that Losi's team drivers use.

Using side cutters,

remove the inner ridge from the front wheels. Glue this ridge to the next ridge on the wheel so that it acts as a spacer. Now, when you mount your front tires, the inner bead of the tire will over-

hang the wheel slightly and so make the tire wider. This modification usually works best with wide front tires such as Losi's Wide Rib and Pro-Line's Wide-5 and Edge front tires.

- **Graphite parts**—my first changes. I added a complete set of Team Losi's* graphite parts: chassis (standard length), suspension arms and rear shock tower. Not only are these parts lighter than stock, but they're also more rigid. Stiffer chassis and suspension parts "isolate" the action of the suspension more effectively to make handling more consistent.

Next, I swapped the kit's no. 4 rear arm-mount plate for Losi's no. 2 plate. The new plate has 2 degrees of anti-squat (the stock piece has 4 degrees); it seems to give the car more traction on very slippery surfaces, and it improves performance on the bumpy sections.

While the chassis was disassembled, I added a set of Trinity's* purple aluminum screws, which look great and are lighter than the original steel ones. Aluminum screws aren't as strong as steel ones, so I recommend that you use the steel screws to attach the rear arm-mount plate and the transmission to the chassis.

- **Rear suspension.** This rear-suspension-arm modification is recommended by Losi's factory drivers. Using a Dremel tool with a cutoff wheel, I removed the small, shock-mount brace from the front of the arm. Then, using the brace as a guide, I drilled a fourth shock-mounting hole in the arm toward the outside. Attaching the shock to this new hole makes the car turn better. The car also seems more responsive through tight, twisty curves, and it is less prone to bottoming out over large jumps.

With this new shock position—

which increases shock speed—it's best to switch to softer rear springs and lighter damping. I use Losi's Yellow springs and no. 55 pistons, and I fill the shocks with 30WT oil. On most tracks, I'll use three 0.030-inch-thick washers inside each rear shock.

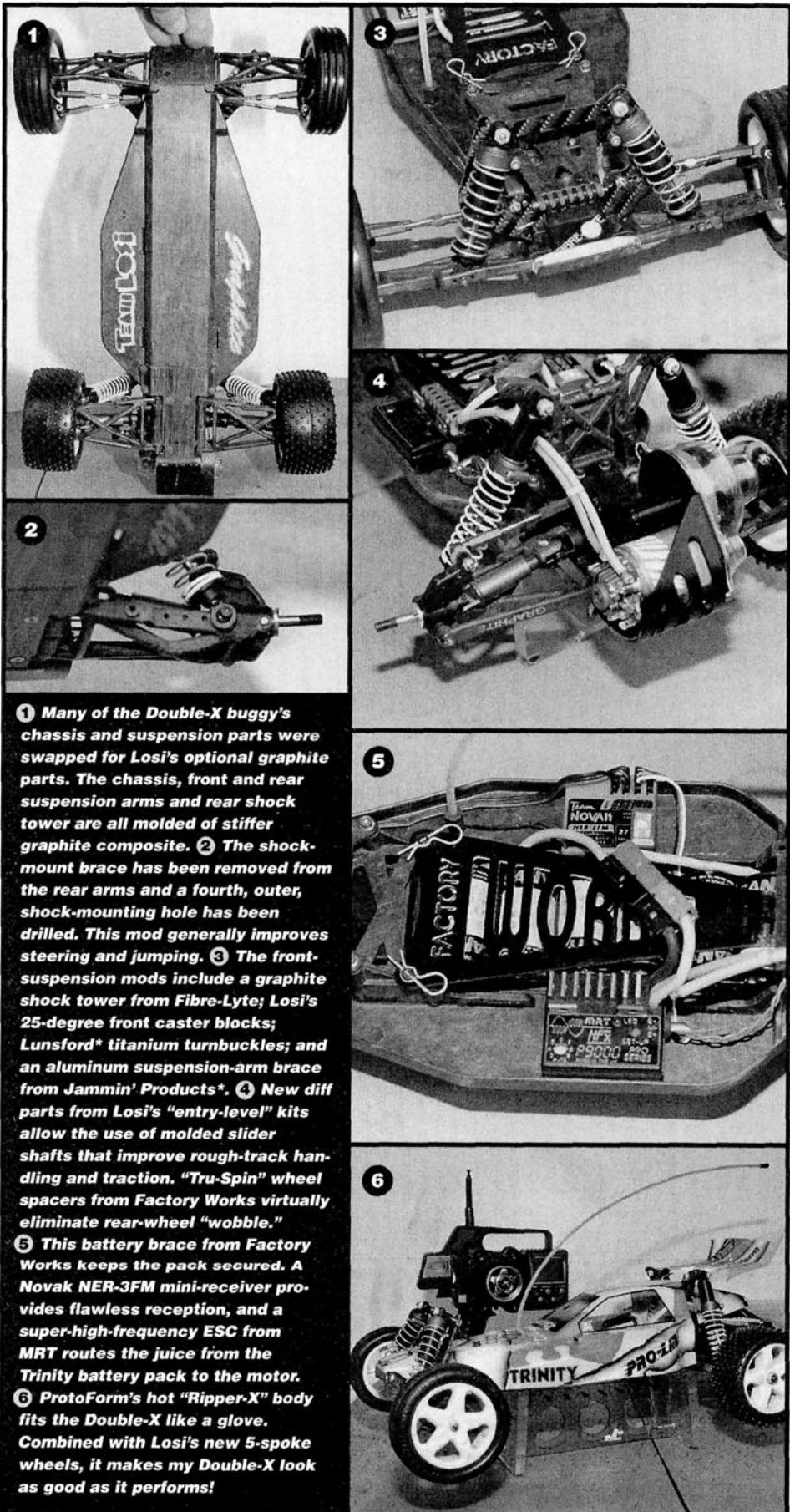
• **Front suspension.** My graphite front shock tower comes from England. Made by Fibre-Lyte and imported into the U.S. by Japan R/C Imports*, it features an upper cross-brace and an additional hole for the camber rod. Fibre-Lyte also makes a graphite rear tower, but it doesn't include the wing-mounting tubes like the stock one, so I didn't use it.

On the front shocks, I usually use Losi's Orange springs (the softest), but if the track is really bumpy, I might try Losi's Silver springs, which are slightly stiffer. Orange springs provide a bit more steering through slower, tighter turns, and they minimize "hooking" when exiting turns. I almost always use no. 56 pistons in the front shocks, and I fill the shocks with 30 to 35WT oil. I usually limit front shock travel by installing one, 0.120-inch-thick Losi "A" spacer. For an exceptionally smooth track, I'll add one 0.030-inch-thick washer to limit travel further.

• **Caster.** I swapped the stock, 30-degree front caster blocks for Losi's optional 25-degree blocks. These new blocks improve low-speed steering and make the car steer more consistently through high-speed turns, although initial turn-in is slightly diminished.

• **Slider shafts.** I usually race on a bumpy track, so I installed a set of molded slider shafts. Designed for Losi's new "sport racer" kits, they'll work fine in any Double-X. Because these shafts allow the rear suspension to operate with less binding, the car works better through the bumps, and rear traction is increased. Steering is slightly diminished, however.

• **Electronics.** An Airtronics* 94151 high-speed steering servo is plugged into a Novak* NER-3FM receiver. I've been using a new speed control



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DOUBLE-X

from a British company called Model Racing Technology. It switches at 9000Hz and is microprocessor-controlled. So far, it has given me excellent run times, and I like its adjustable brakes and current limiter (no word yet about its availability in the U.S.).

For the past few weeks, I've run a Maxtec*, Epic-based, 12-turn quad with Trinity matched Sanyo 1700SCRC cells. When geared at 86/20, this combination provides very driveable power, blistering straightaway speeds and run times approaching 6 minutes. I've set the throttle curve on my Airtronics Caliber 3Ps to about negative 20-percent, and this greatly helped traction on slippery tracks.

Losi's Velcro®-brand-fastener straps do a good job of holding the battery pack, but with just a little additional weight, the Factory Works* fiberglass brace does a better job and looks more trick.

• **Body.** If you own a Double-X, check out Protoform's* Ripper-X body. It fits the Losi chassis closer than any other body I've seen, so little if any dirt can get into it. It looks pretty slick, too!

• **Tires.** I usually run Losi's wide-rib front tires in Silver compound. If I need more steering, I'll switch to Pro-Line's* Edge up front. For my local track, which has a hard-packed surface with loose dirt on top, the rear tires that seem to work best are Pro-Line Flat Stubbies and Losi Step-Pins. I usually start with the Steps and then switch to the Fuzzies, depending on how dry the track gets.

PERFORMANCE

A stock Double-X is certainly no slouch on the track, but with this setup and mods, it's in another league. The most noticeable changes are to the placement of the rear shocks and the 25-degree caster blocks. Steering has been greatly increased, especially at low speeds and when going through tight turns. The car's steering also "feels" better—consistent throughout a turn; and I can get on the throttle sooner coming out of a turn without "hooking."

Overall, these modifications will make your Losi Double-X more responsive and quicker. If you're a novice, leave your buggy in stock form until your driving skill has increased. But if you're more experienced, you'll like this setup—a lot!

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.



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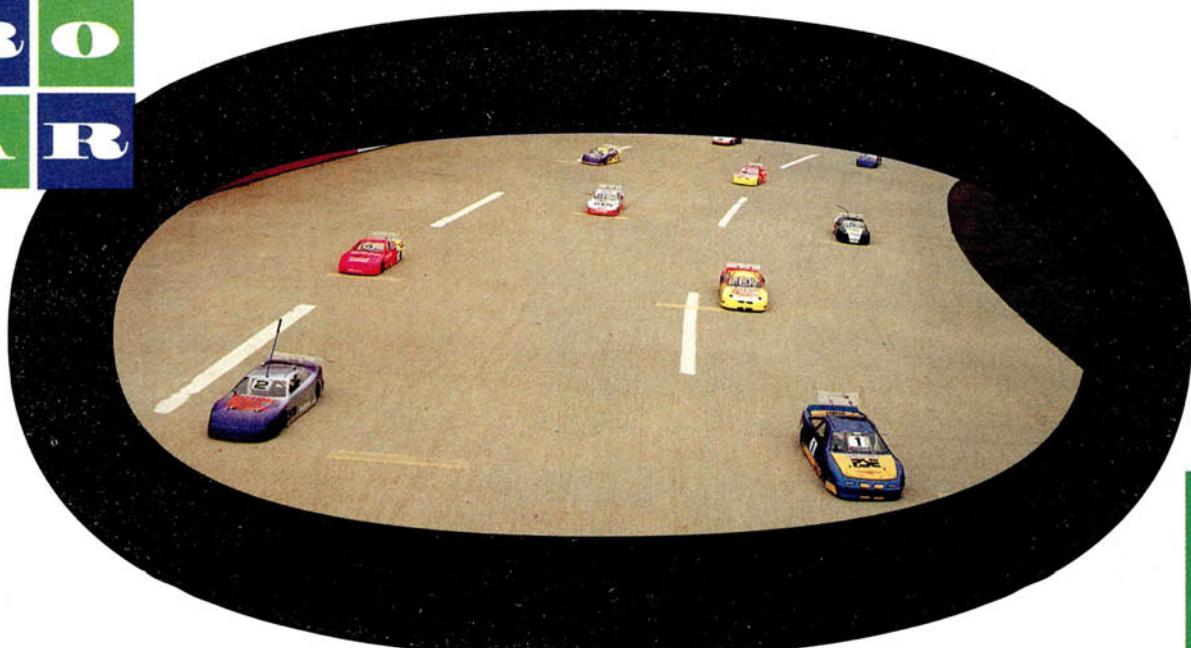
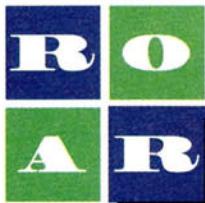
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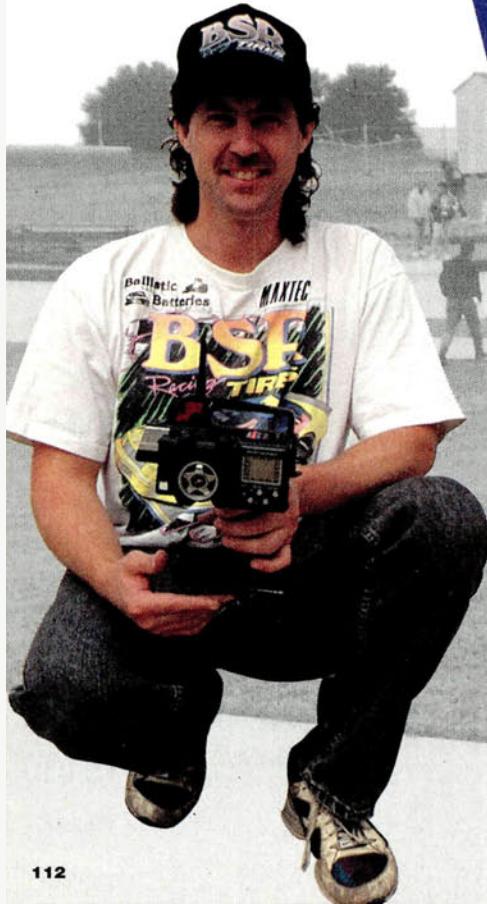
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This section is also available in Model Airplane News



Return of the King

by Rick Schwartz



Va! NATIONALS

THE ROAR Oval Nationals. Welcome to the race that almost wasn't! Originally scheduled for Lake Whippoorwill, FL, in December, ROAR officials had to scramble for a new date and site when it was announced that the Whipp was closing. With his staff, Charles Downing, owner of the King Super Speedway in King, NC, overcame the last-minute change in location and scheduling to put on one hot championship.

The crew at King came to the rescue, and although it was rainy and cold (45 to

50 degrees), they managed to run a full four Qualifiers and all the Mains.

Right in the middle of NASCAR country, the King facility has everything racers need to hunker down and prepare for a race. Designed to replicate the Charlotte Motor Speedway, the track is 385 feet long. Next to the track, there's a huge building that houses the pits and a carpet oval track. The on-site hobby store provided last-minute parts and the replacement parts needed after high-speed crashes.

Tony Neisinger TQ'd in both the 1/10- and 1/12-scale Mod classes and set the track record in both classes, too. Bad luck prevented Tony from grabbing the win in either class.

QUALIFYING

Though scheduled to start on Friday morning, the first round was delayed until 6 p.m. on Saturday night because of rain. Add to that a temperature of around 50 degrees, and you'll be able to imagine the 130 cold racers who, for several days, had nothing to do but wander around and wrench on their cars.

The start of Qualifying broke the tension. By midnight, three Qualifiers had been run. At 8 a.m. on Sunday, the drivers were back for the fourth and last Qualifier. With the temperature still around 50 degrees, racers scrambled to find the best cold-weather tire and equipment combinations.

• 1/10 Stock. West Virginia's Nate Lucas took the TQ, making his first run his best with 36 laps in 4:01.57. Hacksaw Johnson was 3 seconds behind with 36/4:04.38, and Andy McClellan finished third, saving his best run for last with a clocking of 36/4:04.71.

• 1/12 Stock. Only eight raced, but the competition was fast and furious. Tony

Staples finished first with the only 44 laps in 5:03.13. In second place, Bruce Triplett edged out Tom Ickes by 1/2 second with 43/5:01.86 to Ickes' 43/5:02.58.

• 1/10 Mod. Neisinger ruled! Tony Neisinger topped the field and broke the track record with 40 laps in 4:02. Brian Booze was second (40/4:03.59), and Roman Pemberton was third (40/4:04.73).

• 1/12 Mod. Neisinger repeated his record-breaking performance, toppling the track record with the only 49-lap run in 5:02.50. Jim Dieter placed second (48/5:06.34), and Sean Cochran was third (48/5:07.97).

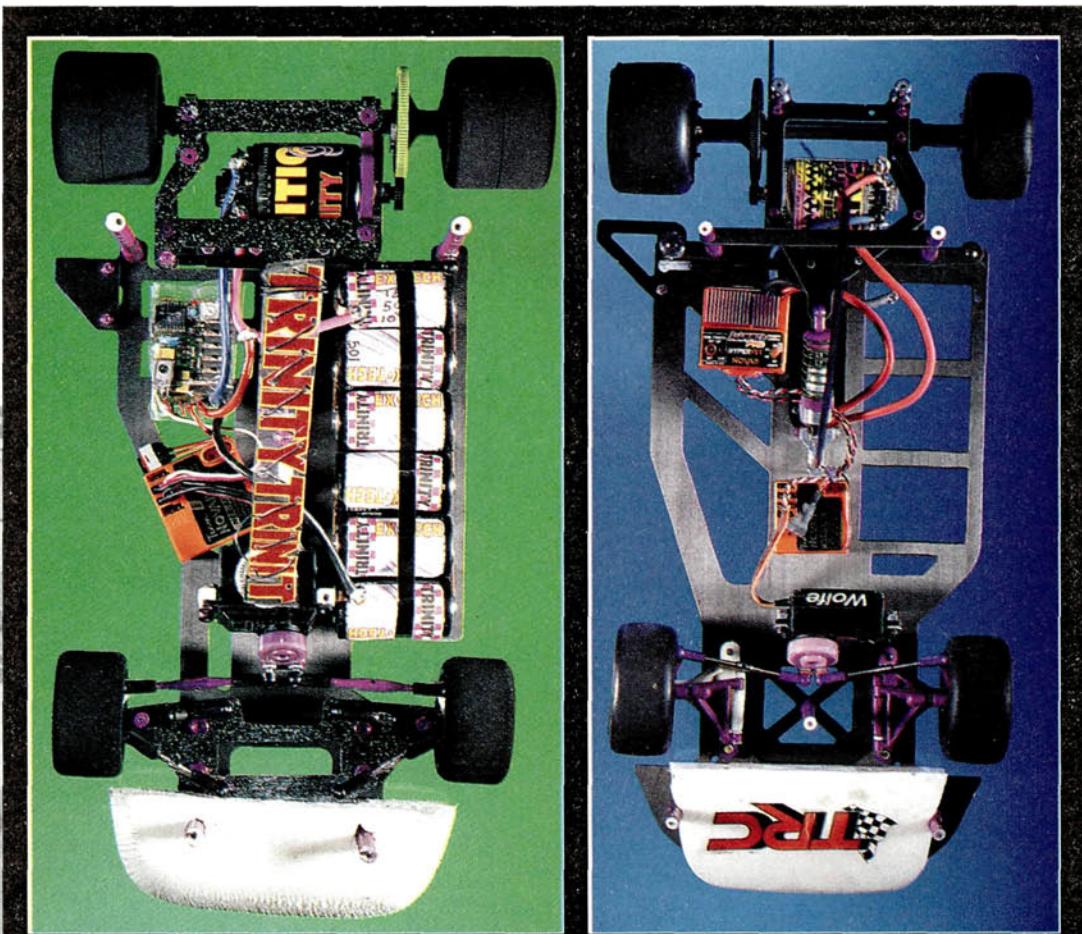


Overall winners

(left to right): Tony Staples (1/12 Stock), Jim Dieter (1/12 Mod), Paul Schaub (1/10 Stock) and Chris Smith (1/10 Mod).

THE MAINS

After the last Qualifier on Sunday morning, the sky was still overcast, so it was decided to run all the A-Mains first. (Continued on page 115)



Jim Dieter's Revolver 12ss—winner of 1/12-scale Modified. It's powered by a '96 Team Edition, epoxy-balanced, 14-turn, triple modified motor and Trinity 30A World Tech cells. The motor was set up with 40 degrees of timing, silver half-cut 4383 brushes and light gold springs. A 31-tooth pinion spins a 100-tooth Magic spur gear. Jim's electronic choices include a Tekin G-12c ESC (outer case replaced by shrink-wrap), a Novak NER-3FM receiver and an Airtronics 94145 steering servo. On the King track, he ran with BSR gold capped tires (standard right, staggered left). [Editor's note: for another race, before the car was photographed for this article, Jim replaced the capped tires with a set of foams.] Jim topped off his winning ride with a '94 T-Bird Protoform body.

Chris Smith's Hyperdrive SSE took first in 1/10-scale Modified. It's powered by a Cam 13-turn triple modified motor and PTI cells (not shown). The motor was set up with 15 degrees of timing, Cam 6220 brushes, one red (stiff) spring on the positive side, one green (soft/medium) spring on the negative side. Chris chose a 29/125 gearing combination, and his electronics include a Novak Hammer Pro ESC and NER-3FM; a JR NES-7005 servo whips it left on command. A BME Patriot II axle assembly replaces the stock rear end. Staggered TRC tires (white right, purple left) get the power to the ground, and a Bolink '90 Pontiac body with a BRP bi-level wing (without the bi-level) tops off this ride.

ROAR OVAL NATS



Double Duty

Being race director of a national event is a monumental task; racing in the same event is almost unheard of! Putting together a national race in less than a month, being its race director and winning a Mod class is unbelievable.

Well, believe it or not, that's what King Super Speedway's manager Chris Smith accomplished. Notified during the last week of August that the Whipp was closing, Chris worked with ROAR officials, track owner Charles Downing and the local racing community to reschedule the Oval Nationals for the weekend of October 6 to 8. When all of the plans had been made and the flyers had been sent out, they realized

that there was a large velodrome race in California that weekend, so the race had to be rescheduled again to the weekend of September 22 to 24. Think about having to send out new flyers, order plaques, arrange parking, power and parts. Well, Chris managed to do all that, act as race director and call most of the heats and still find time to enter and win the 1/10 Mod division. Almost impossible!

Chris says he couldn't have done it without the help of a lot of dedicated volunteers. He especially wants to thank Tate McDaniel of CAM and Robert Joyce of Hyperdrive for helping him with his car. To race, he had to literally run from the announcer's booth to the drivers' stand. For all the time and effort Chris put in to make sure there was a 1995 ROAR Oval Nationals event, he has the thanks of all the racers and manufacturers who participated.

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1/10-SCALE STOCK

Pos.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires
1	5	Paul Schaub	Trinity	Handout	Trinity	Tekin	Futaba	Protoform	TRC
2	1	Nate Lucas	Associated	Handout	ESP	Tekin	Futaba	Bolink	TRC
3	4	Mark Aldrich	Woods Racing	Handout	Front Line	Novak	Futaba	Parma/PSE	TRC
4	7	Mike Seeman	Wood Racing	Handout	Ballistic	Tekin	JR Propo	Protoform	BSR
5	3	Andy McClellan	Associated	Handout	4-Real	Tekin	Futaba	Bolink	BSR
6	2	Hacksaw Johnson	Hyperdrive	Handout	4-Real	Tekin	JR	Protoform	BSR
7	10	Glenn Kaeser	Cobra	Handout	Team Smooth	Tekin	Futaba	Bolink	BSR
8	8	Steve LaFara	Woods Racing	Handout	Ballistic	Novak	JR	Protoform	TRC
9	9	Cory Craig	Bolink	Handout	PTI	Tekin	Futaba	Bolink	BSR
10	6	Bill Kellum	Associated	Handout	World Class	Tekin	Futaba	Bolink	TRC

1/10-SCALE MODIFIED

1	6	Chris Smith	Hyperdrive	Cam	PTI	Novak	KO	Bolink	TRC
2	1	Tony Neisinger	Assoc./McAllister/SC*	Maxtec	Ballistic	Tekin	Airtronics	Bolink	BSR
3	2	Brian Booze	CC*/Assoc.	East Coast	Hot Shot	Novak	Futaba	Bolink	TRC
4	4	Gary Warren	Hyperdrive	Cam	PTI	Tekin	Futaba	Protoform	TRC
5	3	Roman Pemberton	Hyperdrive	East Coast	PTI	Novak	KO	Bolink	TRC
6	5	Richie King	Hyperdrive	East Coast	4-Real	Tekin	Futaba	Bolink	BSR
7	7	Frank Polimeda	Trinity	Trinity	Trinity	Novak	KO Propo	Protoform	BSR
8	8	Jim Dieter	Trinity	Trinity	Trinity	Tekin	Airtronics	Bolink	BSR
9	10	Mike Boylan	Associated	East Coast	Crowe	Novak	Futaba	Protoform	TRC
10	9	Mike Herald	Trinity	East Coast	Trinity	n/a	n/a	n/a	n/a

1/12-SCALE STOCK

1	1	Tony Staples	Composite Craft	Handout	Motion	Tekin	Futaba	Bolink	BSR
2	5	Patrick Kivin	Trinity	Dans	Ballistic	Helbing	JR	Bolink	BSR
3	2	Bruce Triplett	Composite Craft	Handout	4-Real	Tekin	Futaba	Protoform	BSR
4	3	Tom Ickes	Woods Racing	Handout	Litespeed	Tekin	Futaba	Protoform	BSR
5	6	Bubba Coker	Hyperdrive	Kisbey	Crowe	Novak	JR	Protoform	BSR
6	7	Howard Baird	Hyperdrive/PTI	Handout	Crowe	Tekin	Futaba	Crowe	BSR
7	8	Don Dietz	Hyperdrive	Handout	Cam	Tekin	Futaba	Protoform	BSR
8	4	Steve LaFara	Woods Racing	Handout	Ballistic	Novak	JR	Protoform	TRC

1/12-SCALE MODIFIED

1	2	Jim Dieter	Trinity	Trinity	Trinity	Tekin	KO	Bolink	BSR
2	3	Sean Cochran	Hyperdrive	Super Critical	Ballistic	Helbing	JR Propo	Protoform	BSR
3	5	Mike Wppard	Trinity	Trinity	Trinity	Tekin	Futaba	Protoform	TRC
4	7	Shane Kocher	Woods Racing	Mighty Motor	Hot Shot	Novak	Futaba	Protoform	TRC
5	4	Terry Ruffy	Hyperdrive	Cam	King	Novak	EV1	n/a	BSR
6	6	Richie King	Hyperdrive	East Coast	4-Real	Tekin	Futaba	Bolink	BSR
7	10	Gary Warren	Hyperdrive	Cam	PTI	Tekin	Futaba	Protoform	TRC
8	9	Mike Blackstock	Woods Racing	Peak	Team Orion	Tekin	JR Propo	Protoform	BSR
9	1	Tony Neisinger	Associated	Maxtec	Ballistic	Tekin	Airtronics	Bolink	BSR
10	8	Frank Polimeda	Trinity	Trinity	Trinity	Novak	KO	Protoform	BSR

*SC = Sassy Chassis; CC = Composite Craft;

New in the Pits

Bagman

Trinity's Rob Cutman showed off their new "Monster Car-go" (no. 9075) extra-large equipment bag—large enough to carry all your R/C gear. It has separate compartments for your transmitter, car, tires and all the stuff you have to haul to an R/C race (looks just about the right size for my lunch!).

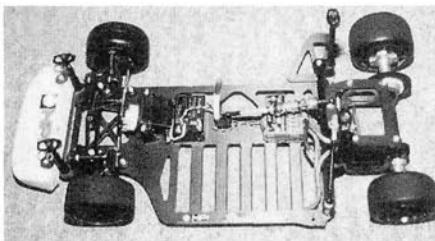
Also new for racing aficionados are Purple Stuff (no. 6050) and the Streetwriter EX-Pen (no. 6060). The Stuff is extra-thick damping grease for the front kingpins for more damping. Da Pen is for body detailing (inside and outside) and is available with fine and medium tips.

■ Contact Trinity Products, 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



Ready...Set...Go!

HPI displayed their new 1/10-scale Road Star 10 GO. Company rep. David Potter gave me all the details, starting with the fact that the car does not have a T-bar. Instead it has two springs to control side roll, and six optional spring sets are available. The racer features wide battery slots that allow more adjustment, a molded front end with double-wishbone suspension, O-rings on the joint pins for a smoother ride and an adjustable axle that allows in-line or offset steering. Bolt all this to a DA Graphite chassis and graphite axle. ■ Contact HPI, 22600-C Lambert St., Ste. 904, El Toro, CA 92630; (714) 837-3250; fax (714) 837-3251.



(Continued from page 113)

• **1/10 Stock.** Throughout the race, fifth-place qualifier Paul Schaub battled TQ Nate Lucas and held on to take the title with 36 laps in 4:03.2. Lucas finished about 1 second behind with 36/4:04.34. The third spot went to Mark Aldrich—the only other driver with 36 laps (4:05.58).

• **1/12 Stock.** Tony Staples justified his 1/12 Stock TQ position by winning the division with the only 44-lap performance (5:03.64). Patrick Kivin came from the fifth spot to take second (43/5:04.51), and Bruce Triplett was third with 42 laps (5:00.45).

• **1/10 Mod.** He broke two track records and TQ'd in both Mod classes, but an A-Main victory eluded Tony Neisinger. Nineteen-ninety-three champion Chris Smith dueled with him throughout and managed to win with 40 laps (4:03.84). Neisinger's car didn't seem to have the same juice as it had in the Qualifiers, but he hung on for second (40/4:05.70), and Brian Booze made a mad dash to finish third (40/4:05.80).

The Stinger

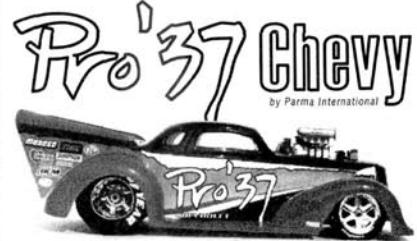
Dave Kisbey of Kisbey Modifieds showed me his new motor/compo-nent cleaner, Sting Clean, which is safe to use on plastic, including Lexan. It removes oil and grease and dries almost instantly. In the business for quite a while, Dave experimented with a variety of cleaner formulas to come up with one that you can use on your motor without destroying your car's body.

■ Contact Kisbey Modifieds, 3309 Rancho Sierra St., Bakersfield, CA 93306; (805) 872-1042.



BURNIN' RUBBER!

It only takes two Parma Pro '37 Chevy's to have a screamin' "Good Time" and schedule your own World Champion type drag race!



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No worries about, specially approved tires - no need to be an expert on setting-up or learning how to "set up" a car that has to fly around high banked ovals. You and one other friend (maybe even Dad!) can assemble a Pro '37 and jump right into low cost, high speed, drag racing action!

The Pro '37 Chevy Good Time Kit includes an incredibly detailed Small Block Chevy Engine Kit that allows you to build the blown & injected engine (shown in picture) and an engine with six carbs, or a front draft blower, or even a tandem version! You'll also have a motor for separate display!

When you're tired of all the hype about entry level classes, specs, tech, & factory drivers, break away to the drags - the truest form of "American" racing and grab yourself a New Parma Pro '37 Chevy Street & Strip Kit.

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The 7th Annual NR/CTPA Worlds

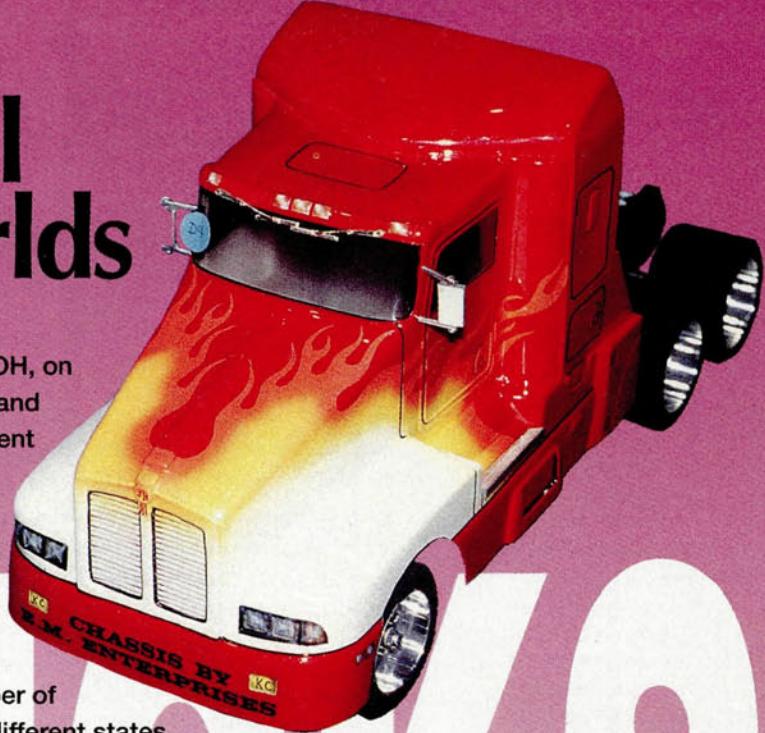
THE SEVENTH annual NR/CTPA World Championships was held in Montpelier, OH, on September 23 and 24, 1995. The pulling and racing took place in the huge atrium of the event site—the local Holiday Inn Holidome.

I arrived early on Friday evening, checked in and then went to look things over. In the atrium, the three pulling tracks were being set up, and the obstacle course was being readied for Saturday's monster-truck racing.

Tables were set up as pit spaces, and a number of them were already occupied by pullers from different states.

In an adjoining room, Hooters Hobbies and Bennett Equipment provided an on-site pro shop for all the participants.

Saturday morning was set aside for late registration, which was followed by the opening ceremony. NR/CTPA president Don Hubert confirmed that there were 294 total entries (227 pullers and 67 monster-truck racers), and then the driver meetings took place. The pullers were told which weight they would start with and were informed of rule changes. The monster racers were told what to expect on the obstacle course. Then it was time to get down to business with some sled-pulling and car-crushing qualifiers. Racing would begin on Sunday.



SUPER SUNDAY

Sunday morning came quickly, and the first matter of the day was the Concours contest. I had really been looking forward to it. A new category was added for the race trucks because it was hard for them to compete with the monster trucks. It was a good decision; some of the race trucks

were simply awesome. The participants voted for best puller, monster truck and race truck. They also picked best paint and best chassis design.

After the Concours, it was time to get down to the final round of qualifying pulls, the pull-offs and four rounds of side-by-side monster racing.

BATTLE IT OUT

by Joe Leffelman

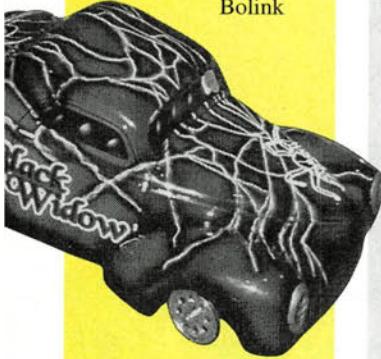


Here are the Concours winners' vehicles in each class.

PULLERS

HOW IT WORKS

For those of you who are not familiar with the truck- and tractor-pulling sport, perhaps some background info is in order. R/C pulling is done on a straight, 4-foot-wide, 40-foot-long track that has a carpet or dirt surface. The actual pulling distance is 30 feet— $\frac{1}{10}$ the length of full-size pulling distance. The object of the competition is to pull the weight-transfer machine (or “sled”) the farthest down the track without crossing either side line. All vehicles in a class start out pulling the same weight. There are classes for virtually every type of R/C vehicle from Bolink



Diggers to the radical Open II purpose-built pullers. The rules ensure fair competition between classes and are similar to those of full-size truck and tractor pulling.

2WD STOCK

This class started things off. Michael Field won the pull-off by taking the 100 pounds 20 feet, 11 inches. Terry Lofty's Hot Pepper went 20 feet, 1 $\frac{1}{2}$ inches to take second. Joe Killian took third, pulling 85 pounds for 29 feet, 6 inches, and A.J. Straw followed in fourth at 29 feet, 4 inches. Josh Butcher went 29 feet, 2 $\frac{1}{4}$ inches for fifth.

2WD SPORTSMAN

Johnny Heath's Dixie Digger won first, taking the 225 pounds 28 feet, 3 inches. Jack Koogler and his Tumbleweed went 28 feet, 2 inches for second. Bobby McQuire took third with 27 feet, 6 $\frac{1}{2}$ inches, and Brad Rudolph close behind at 27 feet, 2 $\frac{1}{2}$ inches was good for fifth.



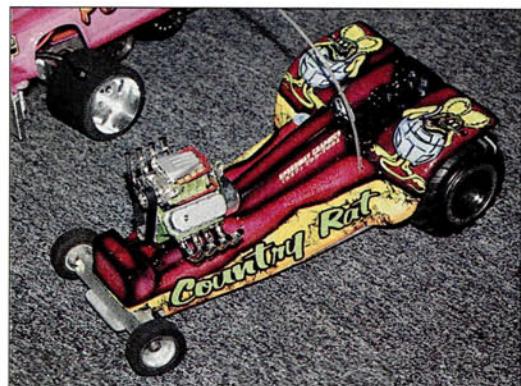
This Bad Boys Fire Department puller sports a working ladder, flashing lightbar, a Dalmation mascot and a crash-dummy fireman.

2WD MODIFIED

This class had no full pulls, but Johnny Heath's pull of 27 feet, 5 inches was the best. Bobby McQuire won second as she took the 175 pounds for 26 feet, 7 inches, followed by George Roger's pull of 24 feet, 3 $\frac{1}{4}$ inches for third. Mike Cusak's Trouble Maker won fourth going 22 feet, 8 $\frac{3}{4}$ inches, and Michael Fields took fifth with 9 feet, 1 inch.

2WD SUPERSTOCK

Fred Haney captured first going 23 feet, 3 $\frac{1}{2}$ inches with 125 pounds in tow. Josh Butcher's Blue Magic took second with a pull of 21 feet, 1 $\frac{1}{2}$ inch, and Joe Killian placed third with a pull of 20 feet, 5 $\frac{1}{2}$ inches. Michael Field took the 105 pounds 28 feet, 8 $\frac{1}{2}$ inches for fourth, and fifth place went to Frank Karpinski for his pull of 18 feet, 1 $\frac{1}{4}$ inch.



This fine example of a “mini-rod” goes by the name Country Rat.

2WD OPEN I

Bobby McQuire outpulled 33 others in this class. She won it by taking 260 pounds 26 feet, 10 $\frac{1}{2}$ inches in the pull-off. Brian Rozhan, with his pull of 25 feet, 7 $\frac{1}{4}$ inches, took second, and a 25-foot, 6-inch pull by Jack Koogler's Gambler won third. Jack Heath took fourth at 25 feet, 5 inches, and “Uncle” Bill Niccum took fifth at 25 feet, 1 $\frac{1}{2}$ inches.

2WD OPEN II

One of the heaviest classes. Jack Koogler's Killer II hauled the 504 pounds 28 feet, 11 $\frac{1}{2}$ inches for first place. Second went to Bruce Kaufmen for his 28-foot, 6-inch pull, and Ryan Mitchell was close behind in third at 28 feet, 3 inches. Jack Koogler's 27-foot, 11 $\frac{1}{2}$ -inch pull won fourth, and Dave Mitchell's Silverbullet went 27 feet, 1 $\frac{1}{2}$ inches for fifth.



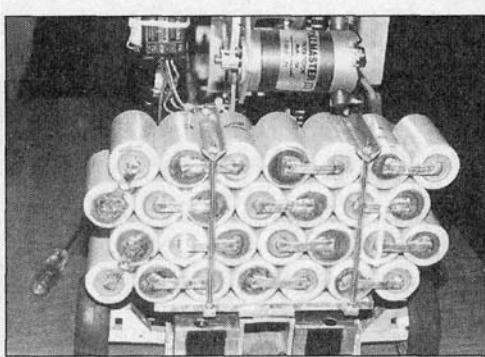
This Recycled Red tractor replicates the full-scale Super Stock “smokers.” Note the flannel shirt on the driver. Mike Gross built this first-place Concours winner.

MINI-ROD

Winning proved to be very tough as several pullers made it to the pull-offs. Larry Edwards won it with a pull of 27 feet, 6 inches. Larry Bennett's Country Rat took the 92 pounds 26 feet, 4 inches for second place. Bob Van Ginkle claimed third with a 24-foot, 8½-inch pull, and Joe Killian took fourth with 23 feet, 2¼ inches. Terry Lofty's Pretty in Pink took fifth with a 23-foot, 1¼-inch pull.

18-WHEELER

Jack Heath took the 100 pounds 29 feet for the title, and Johnny Heath took second going 27 feet, 7¼ inches. Michael Gross took the sled 27 feet, 2 inches for third, and Ernie McReynolds went 26 feet, 9½ inches for fourth. Jack Koogler followed ever so closely at 26 feet, 9¼ inches for fifth.



Count 'em, folks! That's 28 D-size Ni-Cd cells mounted on the front of this 2WD Open II puller.

4WD OPEN II

Larry Bennett won by taking the massive 504 pounds 27 feet, 2 inches down the track. Dave Monahan's pull of 20 feet, 9 inches took second place.

4WD OPEN I

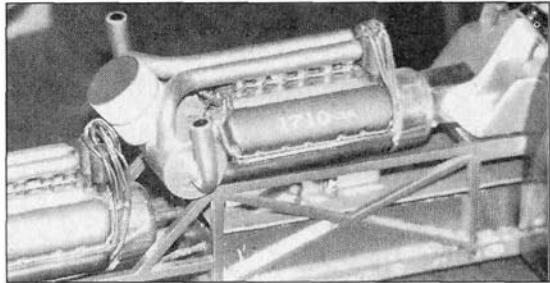
Five pullers made these pull-offs. Buck McReynolds won the title taking the 260 pounds 29 feet, 2 inches. Second went to Brad Pitt for his pull of 28 feet, 3½ inches. Dave Queen took third with a 27-foot, 1¼-inch pull, and Jack Heath's 26-foot, 8¼-inch pull won fourth. Ernie McReynolds took fifth with a 26-foot, 1-inch pull, and Don Hubert claimed sixth by taking the 240 pounds 29 feet, 5½ inches.

BAR TIRE SPORTSMAN

This class had 42 entries but just three in the pull-off. John Jacobus won the title taking the 150 pounds 26 feet, 7½ inches. A pull of 24 feet, 6¾ inches by Spencer McKenzie took second, and Ron Fleming's pull of 23 feet, 6½ inches was third. Fourth belonged to Anthony Brotherson who pulled the 130 pounds for 29 feet, 2 inches. Larry Jaques of Canada took fifth at 29 feet, 1¼ inches, and sixth went to Michael Gross for his 28-foot, 6-inch pull.

DIGGER

Larry Jaques took first with a pull of 24 feet, 9 inches with a 30-pound sled. Johnny Heath's 19-foot, 4½-inch pull took second, and John Kiefer Jr. went 15 feet, 7 inches for third. Bud Woodruff took the 25 pounds 29 feet, 9¼ inches for fourth, and Johnny Heath went 28 feet, 5 inches for fifth.



Mike Gross' incredibly realistic Allison V-12 aircraft engine replica was scratch-built by combining two Parma Hemis.

DUAL-MOTOR STOCK

Four pullers made it to the pull-offs. With 225 pounds in the sled, George Rogers took it 21 feet, 9½ inches for first place. Ron Fleming's Grey Wolf went 20 feet, 9½ inches for second, and Bob Helm was right behind at 20 feet, 7½ inches for third. Dave Queen won fourth going 20 feet, 3¼ inches, and Bill Lofty Jr. took 180 pounds 28 feet, 4½ inches for fifth.

DUAL-MOTOR SUPER-STOCK

Johnny Heath won his fourth title in this class taking 240 pounds 25 feet, 9¾ inches. Bill Lofty Jr.'s Big Trouble took second with a 22-foot, 10½-inch pull and, in third, Jerry Miracle took 205 pounds 29 feet, 5¾ inches. Matt Wilkens went 24 feet, 5¼ inches with his Superbull for fourth.

DUAL-MOTOR MODIFIED

The winner of this class was Brad Pitt with a pull of 25 feet, 2 inches with 375 pounds in the sled. Jack Koogler's Wild Fire went 24 feet, 3 inches in the pull-off and took second. Joe Roxbon pulled 235 pounds 29 feet, 1 inch for third, and Dave Queen took fourth at 28 feet, 7 inches. Ernie McReynolds' 28-foot, 6-inch pull claimed fifth, and Brad Pitt's Pittman II went 28 feet, 1¼ inches to take sixth.



Open II
pullers are
definitely
hard on the
carpet
track. Note
the torn
carpet and
the buildup
of foam rub-
ber from the
tires.

MONSTER TRUCKS

HOW IT WORKS



The monster-truck competition revolves primarily around Tamiya Clodbusters (or highly modified versions of them) and open race trucks such as the Losi LX-T and Associated RC10T. There is even a class for tracked vehicles or "tanks." The monster-truck category imitates the full-size monster-truck races that are broadcast on TV from stadiums across the country.

In this class, the first round consisted of single truck runs on a difficult obstacle course; the object—to earn the lowest elapsed time. The second round was side-by-side drag racing over a simplified, straight-line course; the object—to earn the lowest time and to beat your opponent in the other lane while staying within bounds. Scores from both rounds were added to determine the winners.

If you would like more info, contact the NR/CTPA, c/o Don Hubert, 2321 Greenwood Ct., Champaign, IL 61821; (217) 359-7628. Maybe we'll see you at the next truck pull and monster truck event!

WINNERS



Concours winners from left to right. Front row: Mike Kusik and Mike Gross. Back row: Al Fowler, Carol Queen and Brian Causse

SPECIAL AWARDS

Puller of the Year
Ernie McReynolds
Driver of the Year
Freddie Privett Jr.

Long Distance Award
Brian Page

PRESIDENT'S AWARDS

Puller Mike Gross
Monster Truck
Brian Causse

CONCOURS

Puller
1—Mike Gross
2—Don Hubert
3—Mike Gross

Monster Truck
1—Brian Causse
2—David Gatheright
3—Bari Musawir

Open Race Truck
1—Mike Kusick
2—Ryan Ross
3—Fred Privett

BEST PAINT

Puller
Carol Queen
Monster Truck
Brian Causse

BEST DESIGN
Puller Mike Gross
Monster Truck
Brian Causse

DAN'S R/C STUFF SPORTSMANSHIP AWARDS
Pam Niccum
Matt & Jan Wilkins

2WD STOCK

Nate Briggs' Traxxas Stampede won with a 13.677-second time. Fred Privett's 15.246 was second, and Dave Wright took third with a 15.346. Iowa's Bob Helm got a 16.714 for fourth, and Mike Dozier's MRC MT-10M took fifth with a 16.896.

4WD STOCK

Ron Walls took his Clod Buster to the top with a time of 14.701. Tim Powers claimed second with a 16.122, and Freddie Privett's 16.311 took third. Fourth went to Brad Pitt's 17.627, and little six-year-old Ryan Fleming took fifth with a time of 32.145.

2WD MODIFIED

Kyle Rauch and his scratch-built Hornet won the 2WD Modified with a 15.677. Second went to Mike Dozier's 16.269 with Shane Travis getting a 16.692 for third. Joe Leffelman placed fourth with a 18.142.

4WD MODIFIED

This was really a wild time. After Saturday's run, the top dozen times were so close that with a little luck and a super run, any one of them could move up to the top of the heap. Dan Vance had the only USA-1 in the group. He went for the win and let's just say it looked great, but he's probably still putting it back together. Joe Kirkwood was able to hold on for first place in his Jomama Ford with a time of 12.919. Brad Pitt was right behind at 13.144 for second. Tim Powers and his Bigfoot Powerwheels took third with a 13.5, and Jon Lehman claimed fourth with a 14.459. Joe Kirkwood took fifth with a 14.537, and Brian Paige and his Winged Dodge Ram had a 14.887 for sixth.

TANKS

The tanks had a much easier time on the drag course than they did on the obstacle course, and the times reflected it. Brad Pitt won first with a 27.287, and Brian Paige ran a 29.223 for second. Ethan Woodruff won third with a 29.606, and beginner Steven Frame had a 38.813 for a fourth-place finish.

2WD SUPERSTOCK

Ryan Ross won first with some nice driving for a time of 11.922. Fred Privett took second with a 12.966, and young Brian Schirkowsky took third with a 14.178. Fourth went to Bob Van Ginkle at 14.288, and Ethan Woodruff was in fifth with a 15.262.

OPEN RACE TRUCK

The fastest time of the event went to Freddie Privett as he won this class with a blistering 11.234. Ryan Ross was close with a 11.512 for second, and Ron Walls came in third with a 12.025. Ethan Woodruff placed fourth with his time of 12.910.

What? Finished already? Time does go fast when you're having fun. This Worlds was great, and I'm sure everyone will look forward to next year's event. In my opinion, given the high quality of the machines here, there were no losers this weekend.

The NR/CTPA would like to thank all who helped put on this year's event. Participating sponsors include *R/C Car Action* magazine, Bolink R/C Cars Inc., Dahms Racing Bodies, Dan's R/C Stuff, Futaba Corp. of America, Hooter Chassis, McAllister Racing Inc., Novak Electronics, Paragon Racing Products, Parma International, Plano Molding Co., Thorp Mfg., Traxxas and Twister Motors. The NR/CTPA would also like to thank the trophy sponsors—Hooter Chassis and Tri-State R/C Pulling Club. Without their help, the Worlds might not have been the success that it was.

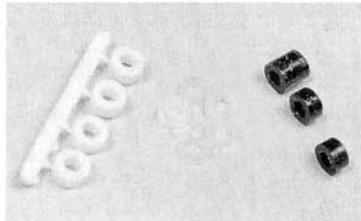
Slam Lower Your Touring Car

by Aaron Biner



IF YOU drive a Tamiya, Kyosho, or Yokomo sedan, you have probably noticed a lot of body roll. This happens because most sedans come with instructions that cause them to be built with way too much shock travel. The best and most economical way to eliminate body roll is to lower your chassis—referred to as “slammin’ your sedan.” You do this by limiting front and rear shock travel.

Traxxas, Team Associated and Team Losi all offer plastic shock spacers in a variety of sizes. How many you use will depend on which shocks you have and the results you want.



The best way to adjust the shock travel is to pick up some of the thin plastic washers that come with Team Associated* and Traxxas* shock-rebuild kits. You can even use thin metal washers, but these tend to put small scratches on the shock shaft during operation, and that can shorten the life of the shaft. For this reason, stick to the plastic washers.

The big question is how many washers to use and where to place them. You'll have to use your best judgment and experiment a little to find the right number of washers, and this will depend on which car you have. On Tamiya sedans, the stock ride height is very high; the Kyosho TF-2 and Yokomo YR-4 are considerably lower. For the Tamiya sedan, the best starting point is three or four 0.030-inch-thick spacers per shock; for Yokomo and Kyosho cars, one or two spacers per shock should be enough.

It's easy to install the spacers: just disassemble your shocks and pour

This Tamiya shock shaft has three Associated shock limiters. The photo shows their correct positions.

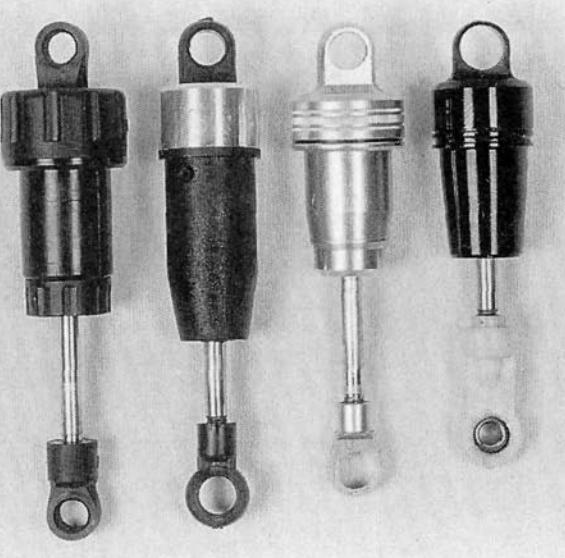
out the oil, so that you have a complete shock shaft and piston assembly. Next, remove the ball cup (rod end) from the shock shaft, and slide the plastic washers over the threaded end of the shaft until they're flush with the bottom E-clip that secures the shock piston. Finally, put the shock shaft and piston assembly back into the shock-body assembly, and refill the shock with oil.

If your sedan still has too much body roll, try a thicker oil or a piston



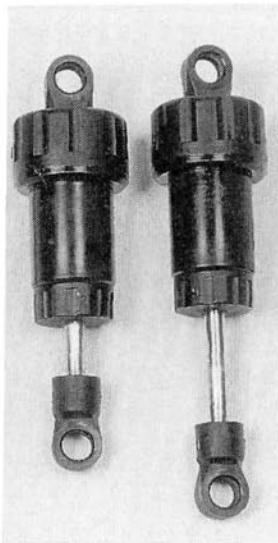
Shock oil affects body roll. Associated, Trinity and Team Losi all offer high-quality, 100-percent pure-silicone shock oil.

PHOTOS BY WALTER SADAS

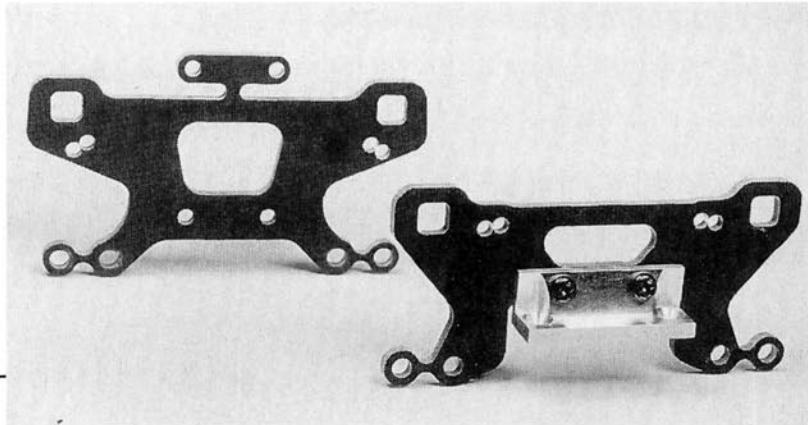


From left to right: Tamiya, Kyosho, Kose and Yokomo shocks. No matter which shocks you have, limiting the suspension travel will improve your sedan's performance.

with smaller holes or fewer holes. On my Tamiya sedans, I run Trinity 50 to 60WT shock oil; and on my Yokomo and Kyosho sedans, I use 70 to 80WT oil—all with the one-hole pistons. Remember, the thicker the oil, the less your chassis will roll. But if your oil is too thick, your car



The Tamiya shock on the left has spacers; the shock on the right is stock. The shocks with spacers will drop the sedan's chassis more than 1/4 inch, and that will greatly improve the way the car handles.



The HPI front and rear lowering kits will considerably reduce the ride height of Tamiya sedans without the need to add shock-limiting spacers. It's still a good idea to limit up-travel by installing a rubber O-ring.

won't roll enough; it will understeer and be unresponsive, so some trial and error might be necessary.

STILL TOO MUCH ROLL?

OK, you've tried all these suggestions, but your sedan *still* has too much body roll. At this point, you might be tempted to use some strong language—no need for that.

• **Use O-rings.** Just calm down, and put an O-ring or two between the threaded ball end and the bottom of the shock body on the shock shaft (but be sure you don't put the O-rings between the bottom shock-spring retainer and threaded ball end). Any normal shock O-ring will help to reduce body roll by preventing the shock from moving all the way up.

If you are slammin' a Tamiya sedan and using Kose* shocks or the optional Tamiya shocks instead of the stock shocks, you should be aware that these are shorter than the stock shocks, so you'll have to use fewer spacers to lower your car. For the optional Tamiya shocks, one or two spacers per shock should get the job done; for the Kose shocks, one spacer per shock should do the trick.

• **Use a lowering kit.** To lower your Tamiya sedan, you can use the HPI* lowering kits—part nos. 6410 (front) and 6400 (rear). The shock mounts that come with the kits have appropriately positioned pre-drilled holes

Slammin' your sedan is one of the easiest and least expensive things you can do to make your car work better.

to lower the chassis without using spacers; but you might still want to use extra spacers to lower your sedan even more. When using these kits, it's still a good idea to use an O-ring to limit up-travel, as mentioned earlier. These lowering kits can alter the shock geometry, so you'll need to experiment a little before deciding which method of slammin' your sedan is the best one for you.

READY TO ROLL

When you have as much roll as you want (as I said, you'll need to experiment a little to find which combination works best for you), put the body back on your car and check the wheel clearance. You

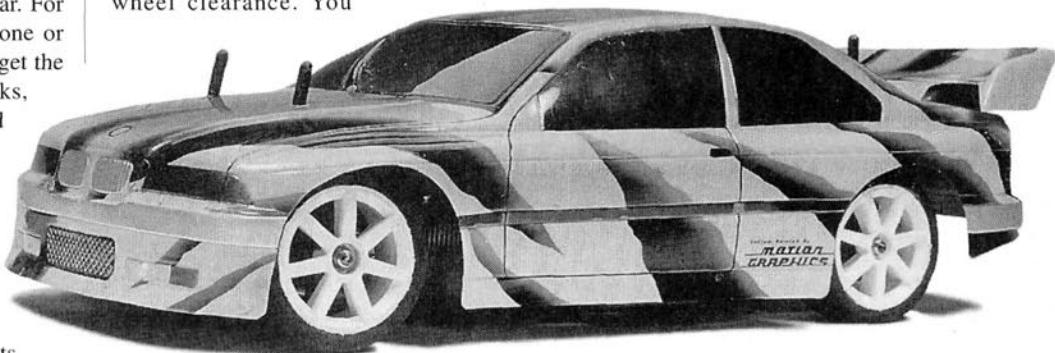
might need to enlarge the wheel wells a little. You might also want to trim the bottom of the body a little so that it doesn't rub on the ground when the car corners at high speeds. When racing, there's nothing more annoying than the screeching of a body scraping the track in certain turns (especially if it's *your* car!). This rubbing can produce enough friction to substantially increase your lap times; nobody needs that!

That's about all there is to it. Slammin' your sedan is one of the easiest and least expensive things you can do to make your car work better—a lot better! And, as a bonus, your lowered car will have a very cool street-racer look. Nothing left now but to head out to the nearest track or parking-lot race and see how low you can go!



Placing a rubber O-ring between the shock-body bottom and the spring retainer will help to reduce body roll by preventing the shock shaft from moving all the way up.

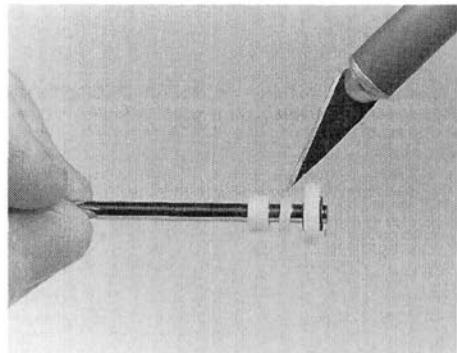
*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■



Trim the body so it doesn't scrape on the ground and sound like fingernails scraping a chalkboard. Don't you hate that?

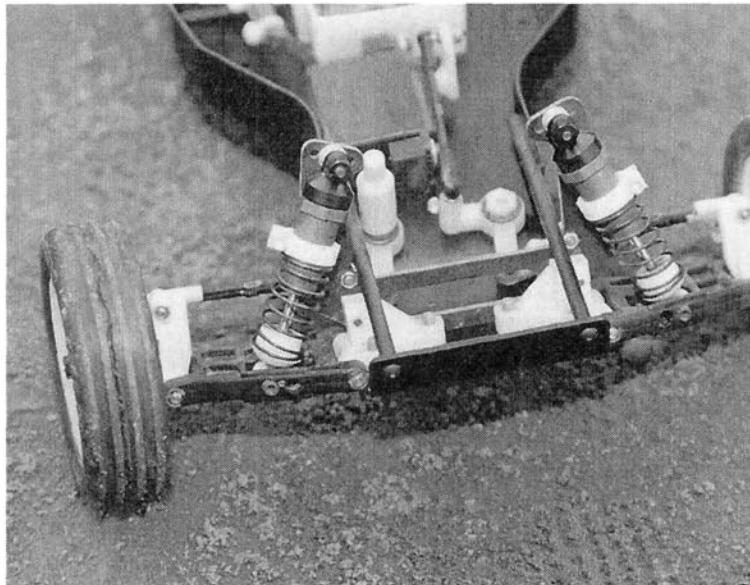
TECH HEAD

by Frank Masi



For smooth tracks, limit shock travel by sliding small spacers over the shock shaft—between the piston and the shock seals.

Tuning for Extreme Conditions



When setting your car's suspension to handle rough tracks, pay extra attention to the shocks; changing shock oil, springs and pistons will greatly affect your car's performance.

LET'S BE REAL. How many of us actually run our cars and trucks on smooth, perfectly groomed tracks? Unless you live in Southern California, the tracks in your area are probably pretty bumpy and rutty and have more than their fair share of sticks, leaves and small stones, too!

If you want to be fast on rough tracks, be prepared to spend lots of time working on your suspension setup. Finding that elusive "perfect" setup may take several weeks, but if you're per-

sistent and know where to focus your efforts, you will find it.

When running on bumpy tracks, shocks are crucial. If you can get the right combination of spring, piston and oil, you'll be 90-percent dialed! If you learn to "read" the track, you'll find shock tuning much easier. Ask yourself these questions.

IS THE TRACK SMOOTH?

If the track is smooth, try:

- Stiffer springs. As we all know, bumps slow you down, so smooth tracks

usually allow higher speeds and faster cornering. Using stiffer springs will allow your car's chassis to remain flat during cornering, acceleration and braking. It will spend less time "wallowing," so transitions from turns to straights will be quicker.

• Pistons with smaller holes. Yes, yes! The size of the hole in your shock's piston makes a large difference to how your car handles. Smaller shock-piston holes allow less oil to flow through, so as the shock is worked, damping will increase in greater proportion to how fast the piston travels through the oil.

This type of damping works well on smooth, fast tracks because it makes the car feel more "planted" and have less chassis roll in the fast turns. In general, you'll find the car more responsive and stable.

When you change to smaller pistons, you'll need to fill the shocks with a slightly thinner oil to retain the same "static" damping that your shocks have with your current, larger-piston setup. "Static damping" refers to how your shocks feel when

you move the car's suspension by hand, i.e., at slow speeds.

- Limit shock travel. Do this by placing one or more plastic spacers on the shock shaft—next to the shock piston and inside the shock body.

Here's the reasoning behind limiting shock travel: a low car has a low center of gravity; your car will handle better if it can remain at its proper ride height throughout the track. When you limit shock travel, you limit how high the chassis can rise off the ground. This means that your chassis will roll less in the turns; its front won't rise as much when it's accelerating, and its rear won't rise as much when it's braking.

Never limit shock travel to the point at which your car sits below its proper ride height (usually in an arms-level position).

IS THE TRACK BUMPY?

If your track is bumpy, try:

- Softer springs. These help the car's suspension to move more independently of the chassis. When used on the rear of the car, soft springs improve traction because they allow the rear suspension to conform more closely to the track's surface.

- Shock pistons with larger holes. On a bumpy track, the goal is to prevent the car from bouncing; you want the tires to remain in contact with the ground as much as possible. To achieve this, you'll need to make your car's suspension operate as freely as possible.

If the track is moderately bumpy, you may find that pistons with

medium holes will provide good damping on the bumps and ruts, yet will allow your car to retain the agility and cornering speed of a smooth track setup.

If you notice excessive bouncing, or if the car begins to roll over in the turns, try pistons with larger holes. They're less restrictive to oil flow, and they can move faster

through the oil than those with smaller holes. Because of this, your shocks will be able to move more quickly and absorb harsh bumps without transmitting the "shock" to the chassis (no pun intended!).

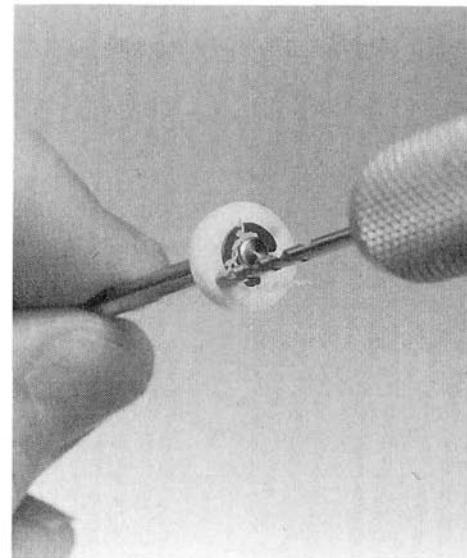
Usually, manufacturers offer pistons in a variety of sizes to fit their shocks. The pistons with the largest holes, e.g., Associated's* no. 1 piston and Team Losi's* no. 54 piston, will work the best on bumpy tracks.

- Increase shock travel. Pretty simple: just remove any shock-travel spacers that you may have installed. Remember that if you increase shock travel too much, your suspension geometry may be affected, and your drive shafts might bind or even fall out of the transmission outdrives.

DOES THE TRACK HAVE VERY SHARP BUMPS?

For tracks that have many smaller, sharp-edged bumps and ruts, modify your rear shock pistons by slightly enlarging one or more of the holes. Doing this further reduces the shock's "pack" (the speed at which it encounters hydraulic locking or greater damping resistance). Reducing pack allows the shock to move even more quickly to absorb very harsh bumps taken at faster speeds.

When drilling pistons, it's best to use a hand drill with a new, sharp drill bit. Also, enlarge the piston's holes only slightly; don't go crazy. Davis Diesel* sells a neat little hand drill that even comes with an assortment of bits that work excellently for this.



DOES THE TRACK HAVE LARGER JUMPS?

If your track is pretty bumpy yet also has large jumps, you have a dilemma: if you've set your car to have less pack (pistons with larger holes), it will probably bottom-out pretty badly over big jumps. It also won't jump as far as or as well as a car that has shock pistons with smaller holes.

You'll have to choose between jumping ability and rough-track handling. If you feel that you'll be faster by making the big jumps, experiment with stiffer springs and pistons with smaller holes. But there's a good chance that if your car is set up to handle the bumps, you'll be faster. Just "roll" the jumps to avoid bottoming-out.

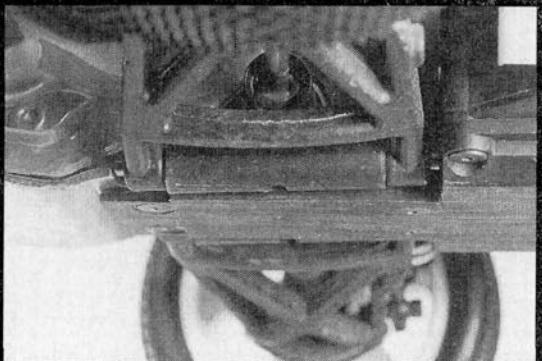
There's so much involved in tuning a car's suspension that someone could surely write a book (several actually!). This column can't possibly cover every aspect of chassis tuning, but I hope these basic guidelines will help you to get your suspension in the ballpark.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■

OTHER THINGS TO TRY

In addition to tuning your shocks, there are a few other mods you can try to improve your car's handling on bumpy tracks.

Anything you can do to free up the action of the rear-suspension arms will help rough-track handling. As a rule of thumb, having less anti-squat improves the way your car or truck goes over bumps. Having fewer degrees of rear anti-squat allows the rear arms to pivot more closely in line with the car's chassis and its direction of travel (forward). On the downside, having less anti-squat allows the rear of the car to drop more during acceleration.



Anti-squat is the angle at which the suspension arms pivot in relation to the chassis. Reducing this angle generally improves handling over bumps but reduces acceleration.

Most manufacturers of racing-type kits offer rear arm mounts or plates that allow you to change the settings.

Placing all of the car's rear toe-in out at the rear hub carriers also improves rough-track handling by freeing up the rear suspension arms. I think that Associated is the only company that offers this option for its trucks and buggies. The next time you're at a bumpy track, try using 0-degree arm mounts and 3-degree hub carriers on your Associated car or truck.

At times, you'll have to modify your shock pistons to cope with certain types of track. A small, hand-drill works best for this task.

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots RACING

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.

Capitol Cruisin'

by Doug Mertes

In the Washington D.C. area, the Track of Gaithersburg, MD—an indoor facility with several slot car layouts and a 225-foot banked carpet oval—hosts races on the infield's $\frac{1}{2}$ -scale roadcourse layout for The Formula One Club of Washington. The club meets there every Thursday night to race their F1 cars in a low-stress club format. The racing is very close because the rules are very simple: you can use any brand or type of F1 car you want, and you can modify it in any way, as long as you run the club-spec motor—a zero degree timing closed-endbell motor with very weak magnets. All the cars run at the same slow speeds, but you get used to it after a couple of laps, especially since the track is fairly narrow and challenging. Because the motors pull so few amps under load, run time is not a problem.

The secret to the fun is in the driving, no matter how fast you go. These folks would rather run slowly and get in more stick time in a relaxed atmosphere, than go fast at any cost. They finish by 10 p.m., and they can be home in time to get a good night's sleep. Instead of spending a full weekend day at the track, they put in an evening's worth of solid competition that doesn't pull them away from their families or responsibilities. They've taken what had threatened to become an obsession and turned it back into what it was supposed to be in the first place: a hobby.

The club has even started a points series that rewards the drivers who improve most on the previous week's lap times and lap count. The people who race in this type of club format don't do it for glory or trophies; they do it because they want to learn how to drive better, to gain just a little more control of their cars, and to feel they've taken one more step on the road to competitive competency. This type of series format rewards exactly what the members are attempting to achieve.

If you'd like to get something like this started in your neck of the woods, feel free to contact The Track in Gaithersburg, MD [(301) 417-9630] for a copy of their rules.



call now!
Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series
(404) 963-0252

Tamiya R/C Championship Series
(800) TAMIYA-A
Kyosho R/C Sport Racing
(800) 682-8948 ext. 085F

Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity's Street Spec Series
(908) 862-1705

Above: the Thursday night racers on the drivers' stand and on the track prepare for battle. **Left:** F1s tear up the track during the A-Main.

The Valley of "Death"

Paul from the Coal Valley Raceway in Coal Valley, IL sent us this shot of "Team Death's" 300-foot backyard track. He says the track features lots of gnarly bumps and jumps. They host weekly races and, when the donation box gets full, they host a trophy race with of the hickory-smoked food and fun they can handle.

AMIYA

2 for 1 Special

Here's a look at two of the Championship Series races. Race 18 was hosted by Ebersole Hobby and R/C Raceway in Wichita, KS. Many enthusiasts decided to enter more than one race per event. It seems that it is becoming more difficult for racers to select just one vehicle to race.

Race 19 was hosted by Action Hobbies in Tulsa, OK. Their 60x130-foot track featuring interior barriers made of vinyl gutters was the perfect venue for the 108 racers and their parking-lot beasts.



Race 18 Winners

F1
1—Doug Grant
2—Bob Doane
3—Ryan Krause

FWD Sedan
1—Randy Cook
2—Kevin Camp
3—Scott Ernst

4WD Sedan
1—Scott Ernst
2—Kevin Camp
3—Mark Henderson

4x4 Truck
1—Brian Strickland
2—Ryan Krause
3—Mark Henderson

GTP>O
1—Scott Ernst
2—Mark Henderson
3—Dave Cole

Best of Show—F1
Bob Enoch

Best of Show—Sedan
Kevin Camp

Best of Show—Truck
Chris West

Best of Show—GTP>O
Bruce Nelson

Top Rookie—Truck
Chris West



Above:
Drivers'
stand jitters
are calmed
after a little
pre-race
practice.

Left: racers line up in preparation for an exciting day of racing. Above: top-place finishers in the F1, FWD Sedan, 4WD Sedan, 4x4 Truck and GTP/GTO classes show off their booty after the race.



Above: during the pre-race lineup, the racers show off their machines.



Below: the winners proudly display their prizes and their winning cars.

Race 19 Winners

F1
1—Russell Johnson
2—Sam Daugherty
3—Neil Sartor

FWD Sedan
1—Randy Cook
2—Kevin Camp
3—Bob Enoch

4WD Sedan
1—Randy Cook
2—Eric Ross
3—Michael Wood

4WD Truck
1—Mark Henderson
2—Marvin Blake
3—Chuck Gough

GTP>O
1—Mark Henderson
2—Jason Davis
3—John Watt

Top F1 Rookie
Chris Andrews

Top Sedan—Rookie
Chris West

Top Truck—Rookie
Christopher Bell

Best of Show F1
Eric Ross

Best of Show—Sedan
Eric Ross

Best of Show—Truck
Chris Hill, Jr.

Best of Show GTP
Randy Cook

INDEX OF MANUFACTURERS

A&L Mfg., 505 N. Smith Ave. #105, Corona, CA 91718; (909) 735-5249; fax (909) 735-5642.

Aero-Car Technology, P.O. Box 336, Western Springs, IL 60558-0336; (708) 246-9027.

Airtronics, 11 Autry, Irvine, CA 92718; (714) 830-8769.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

Autographics of California, 4620 New Horizon Blvd., 93313; (805) 836-2886; fax (805) 836-0938.

Aveox, P.O. Box 1287, Agoura Hills, CA 91376; (818) 597-8915; fax (818) 597-0617.

Boca Bearing Co., 7040 W. Palmetto Park Rd., Ste. 2304, Boca Raton, FL 33433; (407) 998-0004; fax (407) 998-0119.

BRP Inc., 1575 Lowell St., Elyria, OH 44035; (216) 284-0270.

CRC; Calandra Racing Concepts, 6860 Stanwix Ave., Rome, NY 13440; phone and fax (315) 338-0867.

DA Graphics, 1235 Portola Ave., Spring Valley, CA 92077.

Deans Connectors, 7628 Jackson St., Paramount, CA 90723; (310) 634-9401.

DuraTrax; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

Factory Works, 505 Smith Ave. #105, Corona, CA 91718.

Fantom Racing, 50201 Silver St., Vicksburg, MI 49097; (616) 649-9583; fax (616) 649-9584.

Fibre-Lyte; distributed by Japan R/C Imports (see address below).

Futaba Corp. of America, P.O. Box 19767, Irvine, CA 92713-9767; (714) 455-9888.

Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

Hitec/RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071-2854; (619) 258-4940; fax (619) 449-1002.

HPI, 22600-C Lambert, Ste. 904, El Toro, CA 92630; (714) 837-3250; fax (714) 837-3251.

Jammin' Products; distributed by Team Losi (see address below).

Japan R/C Imports; P.O. Box 7009-152; Lafayette, CA 94549; phone and fax (510) 284-5778.

JR; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

Kose; distributed by Japan R/C Imports (see address above).

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.

Litespeed, P.O. Box 4765, Spokane, WA 99202; (509) 535-2717.

Lunsford Racing, 2500 Three Lakes Rd., Ste. A, Albany, OR 97321; (503) 928-0587; fax (503) 967-5917.

Maxtec Development, 1029 Glendon Ave., Los Angeles, CA 90024; (213) 937-3385; fax (213) 939-9074.

Matrix Motors; distributed by Integy/Matrix Technology, 7710 Melrose Ave., Los Angeles, CA 90046; (213) 655-3968/1860; fax (909) 627-4132.

Model Rectifier Corp. (MRC), P.O. Box 391, Edison, NJ 08818; (908) 248-0400.

Motor Man; distributed by Hobby Warehouse of Sacramento, 8950 Osage Ave., Sacramento, CA 95828; to order (800) 333-3640; (916) 381-7588; fax (916) 381-7589.

Novak Electronics, 18910 Teller Ave., Irvine, CA 92715; (714) 833-8873; fax (714) 833-1631.

Pacer Technology, 9420 Santa Anita Ave., Rancho Cucamonga, CA 91730.

Paragon Racing Products, 340 Industrial Blvd., Waconia, MN 55387-1738; (612) 442-6364; fax (612) 442-6368.

Parma Intl., 13927 Progress Pkwy., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.

Peak Performance; 23352-J Madero Rd., Mission Viejo, CA 92691; (714) 707-4683; fax (714) 707-4684.

Protoform Inc., P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

Robinson Racing Products; 4968 Meadow View Dr., Mariposa, CA 95338; (209) 966-2465; fax (209) 966-5937.

S&K Racing Products, 607 East Market, Panora, IA 50216; (515) 755-2020; fax (515) 755-2976.

Sermos RC Snap Connectors Inc., Cedar Corners Station, Box 16787, Stamford, CT 06905; (203) 322-6294.

SR Batteries Inc., Box 287, Bellport, NY 11713; (516) 286-0079; fax (516) 286-0901.

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; (714) 362-2250.

Team Associated, 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400.

Thorp Engineering Corp., 1715 East Fairfield, Mesa, AZ 85203.

Traxxas Corp., 12150 Shiloh Rd., #120, Dallas, TX 75228; (214) 613-3300; fax (214) 613-3599.

TRC, P.O. Box 1058, 210 Charter St., Albemarle, NC 28002; (704) 982-0507; fax (704) 982-0672.

Trinity Products, 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

Weed Designs; Mike Weed, c/o So Cal R/C Raceway, 11930 Valley View St., Garden Grove, CA 92645.

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BACK LOT



This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chris@airage.com

R/C Car Helpline

THE OTHER day, I received an e-mail from a troubled reader. He was having difficulty with one of his R/C cars, and he had nowhere to turn for advice. Not only was this fellow missing some original parts from his kit, but he also couldn't "troubleshoot" why it wouldn't run anymore. Well, I answered his questions on how to get the original parts, and I also gave him a few pointers on how to get his rig up and runnin'.

After a while, another similar e-mail came in and then another and another....



I finally realized that not everyone out there has the opportunity to work with and talk to the specialized contacts that we have throughout the industry. As magazine editors, it is our job to know everything (well, mine anyway!) about the hobby and every manufacturer's product. So, at every company, there are specific people who are properly prepared to answer any and all of our questions and whom we are free to call at any time. Anyway, to get back to my original train

of thought: what do you do when you're having trouble with your R/C car? Well, here's a little list that might help you out in the future.

- **Talk to a friend.** Are any of your buddies into R/C? Maybe one of them can help you out. If you race at a track or belong to a club, ask the other racers; they should be more than glad to help.

- **Call your hobby shop.** If your friends aren't into R/C, your next step is to call your local R/C hobby shop. Explain your problem in detail; the folks there may prefer you to take your vehicle to the store for closer inspection. Most hobby shops that sell R/C cars and accessories usually have someone on staff who's an expert.

- **Contact the manufacturer** of the product that's causing your problem. You'll almost always find a tech-support phone number in the instructions. What's that? You threw out your car's manual? Maybe that's

why you're having trouble getting it to run now! All kidding aside, never throw out your owner's manual; you never know when you might need to refer to it. Call the manufacturers and, more often than not, they'll be willing to help you if they can. (You might even find that the manufacturer you need to contact is listed in this issue's Index of Manufacturers on page 176.)

- **Contact us.** After all this, if you're still running into problems, always feel free to write to us here at the magazine (either by regular mail or by e-mail; we're hip to both; see e-mail addresses on the "Editorial" page). If even I don't know the answer, I'll forward it to Frank, Doogie or George to see if they might have any words of wisdom for you. (You can all laugh now, because we *all* know that I'm omnipotent!)

Remember folks: we want you to avoid frustration and stay in the hobby. If you run into trouble, don't give up hope; ask for help!